ROMANCE OF INDUSTRY SERIES

ANTHRACITE

By

JOHN K. MUMFORD

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by

JOHN K. MUMFORD

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ANTHRACITE

I

Heat and Its Making—Slow Progress from Primitive to Modern Times in Learning the Uses of Coal Which Was to Become the Principal Factor in Making Possible the Age of Steel

HEAT is life; it is energy. It is the world's greatest artificer; it is man's cook, his doctor and his house-servant.

Without plenteous heat, from some source, we should all be Eskimos, living in snow houses, gorging ourselves on fresh-killed seal blubber to keep a little warmth in us, and wearing the seal's skin inside out. There are not sealskins enough to supply a large population. They would be harder to get than they are now. Those who couldn't get any would die.

Without any heat at all, this entire planet would be for rent. Nothing could live on it. Because the sun is the source of heat—as well as of light, millions have worshipped it, with hymns and strange ceremonies. Some sun-worshippers still

remain. The sun god is the chief figure in all mythologies—infinite, universal.

Fire was worshipped because, possessing heat and light, it was held kindred to the sun. That it was upon the earth, could be used and controlled, had to be explained. Prehistoric priests said it was stolen from the gods. And the story hung on. It was a strange legend, devised to satisfy human hunger for the supernatural.

With fire came heat. Man was warmer, and more powerful. It gave him a mastery which he had never known before over many things. So much the more easily he believed it was divine. Priests of many creeds, vestals in long vanished temples of every land, have passed their lives in keeping the flame alight upon altars, to show that it was eternal and to convince the ignorant that control of it was a sort of sacerdotal monopoly—which we know now that it wasn't.

There was an awful lot of "hokum" about it. Anybody could summon fire where there was no fire, if he had patience and two dry sticks, or if by luck he had a flint outcrop near by—and a piece of steel; but the inborn turn for superstitions kept him believing the priestly whoppers.

At first man burned the obvious and easy things, dried leaves, grass, splinters of wood, peat, sticks, logs. Then he discovered that by banking the

fire, the gases could be burned out of wood to leave charcoal, which made an intenser heat, and one more easily controlled. Fire's value and its marvels were multiplied. He could smelt the ores now, which were strewn all around him, and forge weapons with which to kill his neighbor. Science was advancing, but there, so far as heat was concerned, it halted, for ages the length of which we cannot know. The charcoal brazier was the cookstove and the blast furnace of the human race for æons. It burned in the smithies of the ancient East; it cooks the rice and sheep-fat of the far places of Asia today. The deft armorers of Toledo and Milan wrought with its magic aid the swords and pike-heads and inlaid armor of the centuries.

It seems very hard to imagine—but there was no coal, though mountains all over the world were cellared with it. Life went on, kingdoms rose and fell and blood flowed under the slashing and the bashing of charcoal-made steel, while the great labor-saver and labor-doer slept on undisturbed, as it had been doing since long before bibulous old Noah set forth with his menagerie upon a sea of rainwater. All the world, through all the ages we can dream of, was very much alike. Charcoal smelted the copper for the implements which Neanderthal men left in the caves of Europe

200,000 years ago and the gold for the roofs of the temples in pre-Inca Peru; it was creator of the Fifteenth Century cannon which took the place of clumsy catapults and with the aid of Chinese gunpowder hurled huge hand-cut balls of stone against the walls of Constantinople. The brazen gods of Thibet and the mellow bells of Latium were its children. The world does move, but for millions of years it moved at a snail's pace. Coal came slowly, too. A thousand years had passed, after its finding, before a lazy, war-bothered world learned the trick of it.

History, as we know it, is a trifling thing—a patch, a moment in the long life of earth. Through the centuries, while man has been piling spendthrift fires with wood, of which we are just beginning to know the worth, coal—"stone coal"—has been known. Known not as a bankable asset and a working force, not at all. Man, who makes such a fuss about his brains, has to talk about things and make a mystery of them for a few hundreds or thousands of years before he has sense enough to take them in hand and make practical use of them. It has been truer of coal than almost anything else, but then, it was hard to get, and he has always been trying to live without working.

For centuries, molish "sons of light" had been

sitting around roaring wood fires, which used to burn in the center of "great halls" of castles with a hole in the roof instead of in a fireplace with a flue and a chimney to carry off the smoke. There were no tall mantelpieces then, topped by crayon portraits of "Pa" and "Ma," but there were deep flagons of drink and endless speculation about strange stories of rocks that would burn. Away back in Bible times it began. Joseph, negotiating his wheat corner in Egypt, wondered if there would ever be enough of the stuff to make it a "business proposition."

It looks foolish now, of course, that they didn't go out and mine some and get the world to moving, but it was work, and the wood grew in convenient plenty just outside the door which it doesn't any more. Gold was worth delving—or murdering—for, but even if coal were true, even if it did give out a fiercer heat and burn slowly, they didn't need it. And anyway, these were probably tales for children, and such were a sin to grown folk, which the priest would never approve of—unless forsooth he told them himself.

In Roman times they knew well enough about coal, for Theophrastus, writing laboriously with a sharpened reed, told about it, and that was before these Roman disciplinarians, the Germans of their time, crucified Him they called a crazy carpenter,

in the satrapy of Galilee, because He was stirring up the discontented people with a new religion, and claiming that He was a god, or the son of one.

But here is a strange truth, to show how wide the ancient world was. While Rome gossiped and Theophrastus wrote it down, early England was mining coal. We know it because in a ruined angle of the old Roman Wall the prying antiquarians of later times, pottering around in the rubbish to find out how people lived long ago, have found coal cinders such as get into your eye in Pittsburgh and the clumsy tools with which the woad-painted Britons had battered the coal out from the surface beds. The Romans, who had a habit of taking everything back to Rome, didn't take any coal home, but evidently they took the story. For after Rienzi had made all the trouble among the common scum in Rome, and the throne of the Cæsars was standing on three legs and shaky ones at that, this story about combustible rocks persisted. On through the Middle Ages, when people in troubled Europe were making a business of killing each other and building cathedrals to a God of Love, the talk went on.

As early as 852 the Abbot of Peterboro—who was undoubtedly fat, and like most of the prelates of that time in contrast with the preachers of this, probably rich, wrote a receipt for twelve

cartloads of coal. Record of it still remains among the yellowed archives. Plainly he was an up-to-date Abbot and knew a good thing when he saw it, but he couldn't have told the neighbors, as prelates often don't, for all the combing of cupboards has brought forth no further coal news earlier than 1180, when the Bishop of Durham wrote a description of the mining of coal. It ought to be in this book, to show how methods have changed in eight hundred years, but it isn't. He must have thought coal of some importance, for most Bishops in those days were working overtime preaching the Crusades, fanatical but picturesque expeditions to Palestine to recapture from the Moslems the sepulchre of the Christ. They were at bottom political measures, garnished with romance and religion. They cost many lives. So far as net result went the participants might better have been at home, mining coal and making life more comfortable.

The knowledge of coal was filtering out through the world, but it was still a fairy tale for centuries. Man kept on bragging that he knew more than his horse or his wife, but he blundered on through a world of riches, doing his stint by the hardest method, paying with the long labor of his days the penalty of life, and for beauty and use shaping painfully by hand the things his imagination had

conjured. In 1240, when St. Francis in war-ridden Italy was teaching the beauty of brotherly love and self sacrifice and more Crusades were forming, and when none the less the huge empire built up by Charlemagne was beginning to crumble, there is record that says some sensible man was shipping coal into London.

The reason for this was—according to old documents in early script—that the price of wood was so high. What is known unhappily as the "H. C. L." therefore lacks the charm of novelty. Already wastefulness had begun to bear its harvest. The chickens were coming home to roost. And nevertheless—in 1306 the English Parliament, holding that the burning of coal was hurtful to health, solemnly petitioned the king to forbid its use. Pompous proclamations were issued against it. Just whose axe was to be ground by forbidding coal to compete in the Fourteenth Century fuel market, or what noble lord was financing the leading woodyards, we cannot at this distance know, but in the end the woodyards lobby had to yield.

Coal was used for heating, and three hundred long, history-laden years later Simon Sturtevant, whose name nobody has ever heard of, wondered why it was not possible to smelt iron ore with it. It surely was. He knew because he did it, but it

was a whole hundred years afterward that the English iron makers in America, with the finest deposit of the finest coal in the world at their elbows, had to learn it all over again. Charcoal continued to rule the roost. On old farms in many of the Atlantic States the grass today grows strong and verdant in great round places, like the ring left by a traveling circus, where the early settlers used to burn charcoal for iron working and so released soda and potash, which for more than a century have kept sweet the soil and furnished nutriment to the sod.

The mysteries of coal, all its powers and its secrets, were yet to be revealed. Even now we have only begun to know them. The maladies of mankind were doctored by leeches, with charms and bleeding, or by old women, groping in the backwoods of a vegetable pharmacopœia. Men were boiling roots from the forests and mollusks from the seas to make colors, squeezing the infinitesimal drops from myriad flowers to lend fragrance to personality; in the coal they all were hidden, and much more besides.

As its boundless possibilities began to disclose themselves, coal became a human necessity. In the sharp competition of world trade the country with coal to burn held the whip hand. The whole world clamored for coal, and ships were built to

carry it. Canals were dug, at what seemed then a colossal cost, to get the indispensable coal to the place where were ores that needed smelting, to the cities, where mills must run, where food must be cooked and houses warmed against the winter's cold. Almost before the hinges of their lock-gates were working freely the canals were helpless to handle the growing tonnage. Railroads took their place, at ever increasing costs.

With coal available, industry grew, commerce grew, invention rushed to keep pace with requirements. The cry was for more transportation and still more—something to carry more coal. The railroad, at first with its wood-burning locomotives throwing away in the air, in the smoke from their absurd great funnels, a thousand drugs and other marketable things of use, became the master of the country's business. It hauled the coal that saved the wood that went into the house that Jack built. And it hauled everything else besides.

It was no longer "Old King Cole," a lazy, ribald and vinous creature of circumstance, bawling thickly for his "fiddlers three"; it was "King Coal," the monarch of industry, the creator of wealth, the arbiter of international disputes. He called for his coach, and new railroads grew, over tall mountains, through twisting valleys and across wide plains to far horizons. Where he

traveled new villages sprang up and grew into cities, all producing more wealth. Beyond the railheads of new systems the forests vanished and fertile worlds of farmland began to blossom with things for the world's eating.

They call it the age of steel—but it was the coal that made it. How brief it was to be, nobody knew; nobody knows yet, for all the figuring. They thought it would last forever.

At first it was the old story of waste. As coal swelled the world's bank account civilization became a drunken sailor and spent without heed to the thought of a rainy day. Coal made the railroads; the railroads opened new country, which demanded new habitations for the workers, new barns for the products of the land, new mills and warehouses. All these ate up the lumber until, by and by, far-sighted men began to see the end of that. And the price went up always. To build houses for the coal-made business of the coal-made towns, the coal-made railroads raised the price of transport on wood, until fir flooring which was worth $7 a thousand feet in Washington State cost $35 in St. Paul and "what the traffic would bear" in New York. Coal and wood climbed the ladder of price together, and transportation was the backbone of the price.

But there are two sides to everything. The

cost of railroad equipment mounted too, Labor was seeking always a better share for its service, and a large congregation of stockholders, each with his own troubles, tip-toed for dividend day. The railroads that hauled the coal were casting about for ways to meet these requirements and not be found wanting on quarter-day. The answer was to own the lands and mine the coal they carried, charge investment interest to the normal increment in values, and pay to themselves the profits of production as well as carriage.

Merchants awake to the value of a payroll population, realty men eager for purchasers and tenantry, legislatures receptive of enterprise that might enrich the State—all put their hands to the seal of approval. Accumulation of the lands, under legislative sanction, went on until vast areas of anthracite, developed and undeveloped, were added to the assets of the coal-carrying roads. The future seemed to be taken care of until the mines should be empty, and that seemed a long way off. The working world that needed coal had to buy it from the people who had it to sell—and who could deliver it.

To those who rebelled at the concentration of wealth and power, even though final ownership rested in a multitude of small owners of stock in the companies, the prospect was disturbing; but

the day of waste was ended. Slack mining, high-grading, the hashing up of the precious coal deposits to get at the part that was easiest and spoil all the rest, was done. The corporation method —since even the thin veins of coal represented an asset, both to the owners and carriers and to the people who needed it to run their mills and ships and warm their dwellings—was to conserve it all. Already coal was beginning to be coal, and a small fragment was as burnable as a big block, under most conditions more so. The "tailings" of the mines began to go to market instead of to the dump.

Laboratories were busy, experimentalists gave their time to tests, trying to fit the sizes of coal to their most profitable uses and to unravel the mysteries that were known to lie hidden not only in the coal itself, but in the smoke of it. Everything was of use, and all except the smoke would furnish traffic for the roads. By and by, exploring further into the secrets of coal, they found that the products of the smoke, billions of dollars worth of which were whirling away on every wind, were freightable too. The world was going very well, until there came a monitory handwriting on the walls, a growing murmur on the wind. It was a composite sound—the whine of a spend-thrift people who were beginning to feel the shoe

pinch, and the menacing grumble of the wage earners who worked the mines.

It was a poor time for trouble. Civilization was traveling at a headlong speed; invention and industry knew no "quitting time"; electricity was traversing earth, air and water and playing with a thousand new fingers on all the instruments both great and small that make up the world's orchestra—and the power that lay behind them all was in the coal. Winter followed winter and coal must fill the furnaces; coal must turn the mill-wheels, the propellors of ships, the drivers of locomotives. One half of all the trains the railroads could haul went laden with coal, and 25 per cent of the coal they carried was to furnish their own power.

In the year of grace 1923, 443,735,097 tons of coal passed over the railways of the United States. It was well that the fat Abbot who in 1240 had twelve cartloads of coal was safe asleep under a solemn slab in Peterboro Cathedral, but there is no proof at all that he may not have turned over in his grave when the din of the world's coal-driven commerce, as it was quite loud enough to do, disturbed his long repose.

Legislation, listening to new voices in the noise of popular opinion, and courts pledged to the execution of statutory enactment have dissolved

the fabric which through many years, with the authority of earlier legislatures, the coal carrying railroads built up. They may no longer own the coal they carry, nor hold title to the future supply against the day of need. Wise men, measuring with deft instruments, peering underground with geologic vision, weaving long algebraic formulæ, have determined that there is anthracite enough left unmined to last for less than 100 years, at the present rate of production. In any case, new minds are wrestling with the problem of how to lengthen the period of grace; new inventors are facing the still greater problem—how to do the world's work and keep the workers from freezing to death after the coal like the wood is gone. It is anthracite only that is doomed to a short life—estimated at from 60 to 100 years. But when the period of decline begins it will not be a sudden chopping off, but of gradual diminution. Anthracite as a luxury fuel will probably be burned 200 years from now—as cannel coal is today. The bituminous coal resources (including lignite) will last from 2,500 to 3,500 years.

Nature took a million patient years to store anthracite for man's use. Within two busy centuries, perhaps, it is finished, but even so, it has changed the face of the world.

II

Stages in the Process of Coal Formation—Difference Between Anthracite and Bituminous — Pennsylvania Possesses Practically All of Available Hard Coal

IT took a long time to make coal, which burns up so easily and so quickly. It takes only a little of the time we waste so much of to tell its story in headline, which is the way the world now gets all its education. Coal was created in Nature's workshop out of wood, which it resembles no more than hard black bakelite does the liquid carbolic acid and formaldehyde from which it was born. It was made out of tall trees, which, since there was no lumberman to chop them down, died of hoary old age and fell, on the very spot where they had their birth; of small trees which storms and earth disturbances cut down before their time; of giant ferns, whose development into tree forms lacked some ages of being finished; or great grasses, growing to enormous size and density in the chemically rich and well watered soil. It is estimated by geologists that from 700 to 1,000 years of forest

growth was required to produce one foot in thickness of bituminous coal.

One and all, when age came on them or accident robbed them of life, they simply lay down and died. New vegetation piled on top of them, undisturbed by any dredges or dynamite or other bothersome works of man. They lay still and settled, and gradually—with the increasing pressure from above and the absorbent power to take up chemical values from earth and thermal waters—solidified into coal.

There were stages in this process. Man came upon the scene before all of Nature's work was finished, if indeed Nature's work is ever finished. Some of the coal had not been perfected. Some of it was still in the vegetable state, which we call peat—tough, sinewy, still showing the root and stem formations—and which in many parts of the world man cut into blocks and dried out for fuel, because it came easy and his tools were few.

These recipes of Nature were wonderful—but they required close attention and perfect conditions. Some of the vegetable deposits, lacking the pressure, the luxuriance, the proper withdrawal of water at the proper time, rotted instead of hardening, and turned into swamp muck, which wise men now drain with ditches and use to grow onions and celery. Then there was some peat

which had advanced a little further—become a little more like coal. The vegetable fibres were no longer distinct, but the woody origin was plain, the stuff had the lightness of peat, and still kept the brown, "umbery" color of decaying vegetation, which you see in the water of streams that run through swamps and forests with their rotting leaves. Owing to this woody quality men have called this material "lignite," (from lignum which is Latin for wood) or "brown coal" on account of its color.

Lignite has been of use where there was no better coal to be had. In the Northwest—in Washington and North Dakota—Mr. James J. Hill ran a branch railroad to a place called Sand Coulee—or hollow—where outcroppings showed the presence of coal underneath the drifting sands. This bed supplied all the surrounding country with a coal which was far better than the wood they didn't have. When you put it in the stove it was a very short time flying up the chimney, but it gave an intense heat, and it only cost $6 a ton before the war, as against $15 for anthracite, which had to be hauled from the East. People who had the money bought the anthracite and said they saved by doing it.

Even the most veracious scientist cannot say that every bed of lignite would after a million

years have changed into bituminous coal, for he does not know just what the conditions were which were needful for that change. Lacking these, it may all have stayed lignite; but in many places throughout the world bituminous coal is found, and that it was a better condition developed from the lignite there is no doubt. Perhaps owing to moisture, perhaps to chemical environment, it had lost the brown color, which must have been ages in the doing. Bituminous coal serves many purposes, and luckily for man and his industries, it is in large deposits and more easily mined than "hard coal," which permits of its delivery at a lower price, and that is of large importance in a manufacturing business.

But when man had stopped gibbering in the tree-tops, and later when he had "got ahead" so he could move from his primeval cave into a house, when his wife spun wool and wove him a shirt, he was beginning to develop refinement, a nice sensibility and a manner of living which was bound sooner or later to make him rebel at soft coal. And so we have anthracite, the last word in coal, the super-product of all the mysterious processes of coal formation; anthracite, which after the long labor of transformation from trees and other vegetation, was put through a post-

graduate course to make of it what is called "the housekeeper's coal."

From the bituminous state, dirty, incoherent, loose textured and loaded with gases which have got it barred from almost every place where people wear Troy collars and dislike bad smells, it was converted into anthracite, taught good manners, given the needful polish and fitted for good society. It was changed into anthracite very much as the great sugar mills change the brown and soggy cane product from Hawaii or the Indies into the snowy and glistening cubes of lump sugar.

But this was no man-made milling process, carrying coal in "buckets" on an endless belt from one gloomy floor to another, spraying it with this or that, waiting on gentle evaporation to absorb its acid content, sharpen its crystals, drive off its offensive gases, give it a distinctive fracture and cleavage, and shining surfaces aglow with a polychromatic luster like the priceless *reflet metallique*. This anthracite—gleaming, hard, smokeless, practically odorless, slow-burning, high heating, which wasteful folks, even when poor, are too lazy to sift and so save the sound pieces from the exhausted cinders, which are still good to make lye for the manufacture of home soap—the earth went through a series of convulsions to make it.

How long ago it was, or for what great formative end unless it was merely the making of anthracite—the scientists have a professional *cachet* to do the guessing on all these matters. The reverent layman may only derive that after the million or many millions of years that it took to change the wood fibres into peat and then into lignite and bituminous, the earth underwent an agony which hove mountains up higher and made new mountains of the plains; that the flat beds of coal, buried under the accumulations of ages, were bent and folded, lifted into mountains which today look immobile and eternal. With prodigious heat, and with pressure that passes imagination, and endured through inconceivable time, what was common and offensive was "tried" and squeezed out of it.

When at last the contortion was over, the beds of finished anthracite were tilted and folded, running up into hills, with layers of earth or rock between, bending down low into valleys, metamorphosed into a new material, with a character all its own. They were ready now for man when he should come to use them.

It was again a long time. Meanwhile the earth processes of disintegration set in. The frosts and snows began it; mad streams, roaring down the mountain sides, wore and tore and washed away

more anthracite than this world in the rest of its long and blindfold life will ever burn. Even these were not enough to satisfy Nature in her cynical impulse to snatch away and destroy the priceless gift she had been so long preparing. The glaciers came—incalculable masses of ice, creeping with resistless force toward the Southern heat, which drew them on and which alone could conquer by dissolving them. They carved valleys where there had been none, they tore great rocks loose from tall mountains, bore them along like wisps and cast them down in the midst of alluvial valleys far away, for the generations of men to marvel at and explain. It was all an insane play-spell of earth forces, reasonless as the antic of a madman.

After it was ended, the treasure of anthracite, which was sufficient to remake the life of antlike man and enable him to mock at the centuries, was all but gone. Geologists, measuring the mountains, reading the story of the rocks, estimate with their retrospective pencils and paper that there was left for man, when the great spree of millions of years was over, only a little decimal of that great boon. Some say it was one per cent; others that it may have been four; but all agree that not more than six per cent of those vast deposits remained to warm and energize the civilization for

which creation waited. Man would be a pigmy, of course, when he came. Swarming like the insects, he might some time be able to pick the world to pieces, but if in his eggshell of a skull he had sense to compass so colossal a sarcasm, he would read the taunting message on every primordial billboard, that by the sweat of his brow he should forever eat his bread.

To show how easy life might have been made, if sardonic Nature had wished it so, and still to display a measure of fairness, anthracite deposits were scattered in Great Britain and France, in China and other parts of the world. In estimating the anthracite that yet remains, the geologists incline to discourage us by giving little heed to the continents that remain unmastered or where no search or discovery has been made. These may reveal a richer world of anthracite than the six per cent with which we are familiar.

In China, where the real quest for coal has only been begun, though there is reason for believing that the Chinese knew the use of coal long before Christian times, the known formations predict large deposits. The mountains of Persian Kurdistan are known to be ribbed with anthracite, as yet untouched, while Persia, denuded of forest and on her poor farmlands growing only a little barley here and there to nourish both man and

beast, burns at frightful cost the small pea-brush from far mountains, and for the most part and among the poor, the manure of the burden beasts, for which the land is starved. Persian oil is bringing riches to England. Persian coal and Chinese coal and other coal which may yet be found in the waste places where dead civilizations lie buried, may well prove to be the agent of their upbuilding.

England, as if to safeguard her isolation, has a store of anthracite as a foundation for her island and her trade. The Scotchman has mined an inferior grade under the name of "blind coal," and in Ireland where most coal is not of high grade they call anthracite "Kilkenny coal"; but the Welshman sits over a bed of fine anthracite of which the bottom is still far away. He has mined it until mining has become his biggest trade, his food and clothing and drink. The Welsh miner has taught mining to all the world, Welsh "Admiralty" coal has fed the fleets with which England has conquered and still in a measure holds the commerce of the globe.

On the North American continent there are five deposits of anthracite—in eastern Pennsylvania, Rhode Island, New Mexico, Colorado and British Columbia. The Pennsylvania deposits are the only ones of great importance. It has been

said that God, to try the courage and ingenuity of man, made the State of Pennsylvania. With the coal and the iron ore in close propinquity, the prize of conquest over physical obstacles was a wealth, which, smoky and grimy as it is, dwarfs many glittering Golcondas.

To sustain this thought of the wealth which was bundled together in one State, the further fact declares itself that the entire anthracite region is 3,300 square miles, out of a total area of more than 400,000 square miles. Of this expanse, only about 485 square miles is underlain by coal seams. The extreme length of the coal region is only 120 miles and the greatest width 50 miles. The mountains where the anthracite lies, once heavily timbered, are now bare, but a short journey in any direction will bring one to the finest and best tilled agricultural districts on the continent and to the west, in addition to fine farming lands, are vast mines of bituminous coal which are adding their quota to the world's energies.

The whimsical recklessness with which Nature shook down the means of prosperity over the State of Pennsylvania is displayed in the anthracite region itself, for while in all the "basins" which make up the field the general physical properties of conchoidal fracture, high luster and great density, which distinguish anthracite from

bituminous coal, are present, there is a difference in them all. Each district has its variation in specific gravity, which the coal engineers have averaged at 1.47; each has its peculiarity of structure—a dullness or brilliancy of luster, variety of fracture, a habit of breaking into slabs and plates, instead of the typical sharp and almost crystalline chunks. But they are all anthracite. When the process of formation is made plain, the differences are easy to understand.

In these coal measures there are hundreds of beds. They vary in thickness—to make man's job a little harder—from a few inches to sixty feet and even more, while the overlying rock, with its billions of tons of compressive weight, may be either a protective covering of three or four feet or the half of a mountain, measuring a mile or more.

With coal, as with man—the weight it carries determines its character.

III

The Pioneers in Anthracite—First Industrial Uses of the Fuel in the Revolutionary Period—Many Years Required to Demonstrate Its Value

EVERY land has its traditional heroes, of whom great tales are told. That none of these yarns can be proven, that probing historians can find no trace of aught these worthies ever really did or in truth know whether they existed, makes no difference at all. Generation after generation goes right on believing and passing the stories on to its children. At a time when mathematicians are weighing the stars and chemists are picking the world apart, the people of Pennsylvania, to whom anthracite is as sacrosanct as the family tree, are still hanging on to "the smith of Nazareth."

All the county historical societies have branded him as fiction, for an Injun is Injun and Nazareth is twenty-five miles from anthracite, but in the back of its head Pennsylvania still hugs the belief that the Indians—the mighty Lenapee—did lug to this smith, under his spreading chestnut tree, some stealthy bags of anthracite, and that he

ran his forge with them in 1755—seven long years before the white settlers, prowling through William Penn's wilderness, had any suspicion that such a thing existed. When it did happen, in 1762, it was a crowd of Connecticut Yankees that found it. In the end of August ninety-three of them had got as far "Westward Ho" as the rock-ribbed county of Luzerne. Much the worse for wear, they camped at the mouth of Mill Creek, on the Susquehanna, and made hay on what was known as "Jacob's Plains," a fertile piece of bottom land. They were joined by another company—come doubtless to prospect the land for the growing of "nutmegs" and spent ten days deciding to go back home.

When they got back, John Jenkins, the headman, made report that they had discovered in the Wyoming valley both iron ore and anthracite. In the musty documents there is nothing to explain why a bunch of New Englanders should hotfoot it away from so promising a prospect.

Away back in 1754 a committee from what was called the Susquehanna Company had bought from the Ten Nations, at Albany, all the land included in the Lackawanna and Wyoming Valleys. The finding of anthracite and of iron ore caused deep heartburnings among the Quakers. "Royal grants" of a State or two were out of fashion.

It was necessary now to deal with the more or less noble red man. The "Proprietary Government of Pennsylvania"—which was the Penns—fired with the sight of such manifest riches passing into other hands, hatched out a naive idea. They would buy it over again. The hopeful whisper passed around; the wires of frontier politics began to be vigorously pulled, the seekers of benefits were "keeping in the shade of the tallest tree."

James Tilghman, in Philadelphia, wrote in 1866 to Thomas and Richard Penn in England:

> "My brother-in-law, Colonel Francis, one of the officers who lately applied to you for a grant of some lands in the Forks of the Susquehanna—when there shall be purchase of the Indians—has lately made an excursion into those parts and has removed a good many of the people upon the Indian lands, partly by persuasion and partly by compulsion, which has made the Indians pretty easy, to appearances. He went up to the N. E. branch as far as Wyoming, where as he says there is a considerable body of good lands and a very great fund of coal in the hills, which surround a fine and extensive bottom there. This coal is thought to be very fine. With his compliments he sends you a piece of this coal. This bed of coal, situate as it is

on the side of the river, may some time or other be a thing of great value."

Seed like this took prompt lodgment. Two years later—and fourteen years after the Susquehanna Company's purchase—Penn's agents went to Albany and as part of the Stanwix purchase bought the selfsame coal land. Business is business, but the courts for some decades thereafter were burdened by the bitter legal battle over ownership. Cheap as empires were in those days, this one was worth fighting for.

Every year, as the colonies went worrying on toward revolution, brought new proof of the riches buried among the Pennsylvania mountains. While the Albany purchase was being concluded, Charles Stewart was surveying the Manor of Sunbury, opposite Wilkes Barre, and found coal on Ross Hill. But finding it was one thing; using it another. So far as that was concerned, and in spite of all that had been done in England, they hadn't got a step further ahead than the stout Abbot of Peterboro in 852, or Sturtevant the iron worker, who had run his smelters in London with anthracite a hundred and fifty years before.

Pennsylvania had more and more coal, but it needed Obadiah Gore, and in 1769 he came. Obadiah was a blacksmith, in Connecticut. For six years he had been meditating on the story told

by John Jenkins and his company. He had tried Rhode Island anthracite, but couldn't make it heat a shoe. Obadiah would try anything once—in the way of coal. He settled down near Wilkes Barre with his brother in 1770, put on his leather apron and—one authority has said—taught all the blacksmiths in eastern Pennsylvania to put their plenteous coal to some use.

He was providential. By the time the war came on the iron men, with coal on one hand and iron ore on the other, had learned to put two and two together. There wasn't gumption enough in all Pennsylvania, even yet, to make anthracite burn in a grate, as the mediaeval Abbot had undoubtedly done, but thanks to Obadiah, who afterward, for the Yankee brains he had, was made a judge, the smiths were able to use it skilfully in the making of iron to the confusion of the King. In 1775 the patriots bought it from one R. Geer, on Mill Creek, loaded it on flatboats and floated it down from Wilkes Barre to Harrisburg on the Susquehanna, then wagoned it over to the arsenal at Carlisle, where it was used in the manufacture of munitions of war. Jesse Fell, a Quaker who too came afterward to the woolsack, was making nails in Wilkes Barre in 1778 to shoe the Federalist horses. "And," he wrote fifty years later, "I found it profitable in that business. The nails made

with it would neat the weight of the rods and frequently balance over." A profit being demonstrated, the Revolution went on.

Long before Cornwallis had given up the game at Yorktown, the area of anthracite in Pennsylvania had been greatly expanded by new discovery. Just when it was or by whom, the archive saith not, but in 1770 a map was published by William Searle, on which coal is indicated in three places about two miles west of Pottsville, in the Schuylkill region, and also at Mahanoy Creek ten miles away, near the present town of Ashland. The easiest thing anybody did was to discover a coal bed, and as soon as the war was history and the redcoats had ceased to bother people's dreams, they began to make a business of it. Doubt was cast on the report of Major Grant, one of General Sullivan's officers, that on his march through Wyoming in 1779 he had seen "vast mines of coal, pewter, lead and copperas," and nobody has located the last three substances to this day, but the coal was true. John David Schoepf, in his "Travels," told of a bed of brilliant black coal a mile above Wyoming, which "burned without odor and would not soil the fingers when it was handled."

Coal was almost everywhere. Men hesitated to till their cabbage gardens for fear of running

into a bed of anthracite. Mill men digging a tail-race on Norwegian creek after the Revolution uncovered a rich seam of coal, and forthwith the neighborhood promoters formed a company to open mines and saw lumber near the present site of Pottsville. It perished, not for the dearth of coal, but because they had not found yet a way to navigate the Schuylkill without spending far more than they took in. The bugaboo of transportation had already begun to cast its long shadow "upon the road of anthracite."

But discovery went right on. History has given no reason, beyond the fact that he depended on the forest for meat, why "honest Philip Ginter," in 1791, should have been walking through the timber on the top of Sharp Mountain, near the town of Summit Hill and nine miles northwest of Mauch Chunk, when night was coming on. It was already so dark he couldn't help stumbling over obstacles. One of them was a stone. He stubbed over it so hard he kicked it loose, and that was the beginning of the Lehigh Coal and Navigation system of coal mines and coal roads which even to this day is the "daddy of them all."

While damning the rock which had bruised his toes, he noticed that it was black, "to distinguish which," says a later chronicler, "there was just light remaining. He took it up, and as he had

often listened to the traditions of the country of the existence of coal in the vicinity, it occurred to him that this might be a portion of that 'stone coal' of which he had heard. He accordingly carefully took it with him to his cabin, and the next day carried it to Col. Jacob Weiss, residing at what was then known as Fort Allen, now Weissport."

The Colonel took it to Philadelphia. Everybody looked it over, including Charles Cist, a printer, who told the Colonel it was the real thing and advised paying Ginter to tell just where he got it. To do this, they got Ginter a patent of a small piece of land, which somebody else had patented a long time before. After Ginter had built a mill, expecting to be a coal magnate and live happy ever after, the real owners came along and took both land and mill, and all he could do, until the Lord called him home, was to bask in the purely local fame it had brought him, and look pleasant. In the meantime Cist, with John Nicholson and Michael Hillegar, organized, as promptly as they could get the papers through, the Lehigh Coal Mine Company. In the century and a half that has gone by, the anthracite from Mauch Chunk and Summit Hill, which Ginter stubbed his toe over, has made many millions of money. Ginter has slept on undisturbed.

There was a perfect deluge of discovery in the coal fields. Almost any man who had a day off could go out and find a new seam of anthracite; but what they had learned about using it, in forty odd years, wouldn't have filled a thimble. It would burn in a blast, if they put a draft to it. That was all, and few enough knew even that. It took twenty years more to prove that you could fry sausage or heat the "common room" of a house with it warm enough to make family prayers anything but a frigid penance. A few people learned something, and made as much fuss about it as a pullet with her initial egg, but the multitude smiled and shivered. Pennsylvania had a population of doubting Thomases.

In 1802 Frederick Graff, clerk of the Philadelphia Waterworks, tried with many misgivings to burn anthracite in a stove, and it burned. A certain Davis, the waterworks superintendent, learning that Graff had not been blown through the roof, tried it under the boilers and lived to tell the tale. In 1803 Oliver Evans—first since the Abbot of Peterboro a thousand years before—burned it in a grate, and the narrative of his thrilling experience is treasured in the archives of the Wyoming Historical Society. Five years later Judge Jesse Fell, he of the nailery, having had just a quarter of a century to think it over,

also burned anthracite in a grate, and eighteen years afterward wrote to his brother about it. In an old copy of the "Illustrations of Masonry," also, dated February 11, 5,808 of Masonry, he wrote down the record of his triumph, again bearing down on the fact that "it made a better fire at less expense than burning wood in the common way."

Things were moving fast, but still a whisper behind the record. Coal salesmen declined to work on "commission only" after learning the breathless experience of Colonel George Shoemaker in the fateful year 1812. Colonel George had a slice of land on Norwegian Creek near Pottsville. He dug up nine cartloads of coal and took it to Philadelphia. He might far better have been trying to sell books or insurance. They told him he was an impostor, trying to take people's money for "rocks." At last, to avoid a popular uprising, he made a short bargain with the firm of Mellon & Bishop, who were by way of making iron at a mill in Delaware county, and who, having heard of the Revolutionary war and what anthracite had done at Carlisle, started a fire with it early in the morning and then went out, doubtless on the theory of safety first. When they came back after breakfast the building was still

standing and the fire going gorgeously. They used it from that time on.

White & Hazard, ironmakers at the Falls of the Schuylkill, and later large figures in coal, heard of this and bought a cartload at a dollar a bushel, put it in their furnace and began to stoke it. There was no fire. With the second cartload they sat up all night, then surrendered and went to breakfast. When one of the workmen went back for his coat hours later he found the finest fire he had ever seen. Nobody had been there to poke the life out of it.

Up to this time the coal folk had boosted in vain. They scattered handbills, printed in English and German, assuring people that it would burn, reproducing the affidavits of Luzerne county blacksmiths before and after taking to convince people that it was not fireproof. Heads were still hard. What finally forced the Commonwealth of Pennsylvania to sample its own anthracite was that charcoal was getting scarce and costly, and that, with the War of 1812 started, nice, smelly soft coal from the Virginias that you could light with a match could no longer be had.

In 1813 the Lehigh Coal Mine Company, which he had established, made a lease to Charles Cist and two associates, conditioned on their introducing into market of 10,000 bushels of coal.

Even then, the sellers of anthracite were shooed away from the doors in Philadelphia. In 1817 Cist having foozled, the company made another lease, this time to White & Hazard, of their whole property for twenty years, on condition that they should deliver—for their own benefit—forty thousand bushels of coal annually in Philadelphia and its suburbs, *and by way of rental for the mines should pay upon demand one ear of corn.*

In 1821 these lessees shipped 1,073 tons; two years later 5,800 tons; "and in 1824, with many misgivings," says the record, "there was sent down the *enormous quantity* of 9,541 tons." Shades of Schwab and Gary!

Anthracite was coming on. Discovery had progressed. The "anthracite region" was fairly well defined. What was needed now was a market and a way to it.

IV

Development of Anthracite the Story of the Development of Transportation from the Beginnings Down to the Present Time—Water Carriers the Predecessors of the Present Coal Roads

THE story of anthracite is first and last a story of transportation. There was water enough running down hill in Pennsylvania in the early days to float away all the coal that anybody could be induced to buy or burn. What made life a deficit and a general burden was that there was proportionately as much rock in the rivers as there was anthracite in the hills, and that much of the coal was so high up, or so deep down in the valleys that it could not at the first be got to the water except by "backing" it in baskets, as the ancient Peruvians did their gold ore and the Rhine peasants the manure for their vineyards.

The first shipments from the Lehigh district battled their way down among the boulders in 1820, being owned by Cist & Miner, who had tried it before, rather disastrously, in 1813. Mr. George B. Kulp, whose grandfathers came to Pennsylvania only a little later than William

Penn, and who on early coal history is as standard as the Tables of Moses, says that John and Abijah Smith had to come all the way from Connecticut to start anthracite moving down the shark-toothed Lehigh, which they did in 1807. The first load was only fifty-five tons, but after that they kept it moving at four or five hundred tons a year.

They were not the only ones. Anthracite had been found at Carbondale, near the northern end of the Lackawanna county deposits, in 1799. In 1814 William and Maurice Wurts began to work it and the next year hauled the output from Carbondale to Honesdale by wagon and started it on the voyage to Philadelphia by the Lackawaxen and the Delaware. It was no pleasure trip. Ancient history says:

> "The length of the craft was ninety feet, its width sixteen feet, its depth four feet and its capacity sixty tons. Each end terminated in an acute angle with a stem post surmounted by a huge oar some thirty feet in length and which required the strength of two stout men to ply it in the water. It required in its construction 3,800 feet of two-inch plank for the bottom, ends and sides, or 7,600 feet of board measure. The bottom timbers would contain about 2,000 feet of board measure, and the

ribs or studdings sustaining the side planks four hundred feet, making a total of some ten thousand feet. The ark was navigated by four men, and the ordinary time to reach tidewater was seven days. Two out of the three arks would probably reach the port of their destination, one-third was generally left upon the rocks in the rapids of the river or went to the bottom."

Every now and then some venturous speculator launched one of these argosies. It was 1823 before the Wurtses tried it again, but by that time a great deal of water had run down the Lehigh and the turbulent river bed had lost as many rocks as it had swallowed coal cargoes. White & Hazard were "big time" people. They foresaw what the Mauch Chunk anthracite was going to mean. When they had got their "green corn" lease of the old Lehigh Company's property they asked the legislature for an act authorizing them to improve the navigation of the Lehigh.

That it had been tried before didn't count. The legislators said they would deny to no man the right to ruin himself, and on the 20th of March, 1818, the bill became a law. Five months later the Lehigh Navigation Company was formed with $50,000 capital, and two months after that the Lehigh Coal Company, with $55,000, to build a

railroad from the mines to the river. Before snow fell they broke ground, and the next year the road was done. The great Lehigh Coal and Navigation system was a-borning.

The river boulders surrendered hard. Another year found the company in need of more money. On April 21, 1820, the two companies were amalgamated into the Lehigh Coal and Navigation Company, with $20,000 increase in capital, of which White & Hazard themselves subscribed three-fifths. Then they went ahead and swept rocks out of the river and sent down 365 tons of coal. In just one year the city of Philadelphia used it all—about ten carloads.

This didn't discourage them. It opened their eyes to the need for promotion. The name of the company was changed to read "Coal and Navigation." Pennsylvania anthracite was concentrated within a comparatively small area. By and by it would have to be carried far and wide. Year after year the traffic grew and the arks drifted in increasing number down the Lehigh to tidewater. They were twenty to twenty-five feet long and eighteen wide, these early coal ships, and were lashed together to make flotillas sometimes 180 feet in length. In 1831, 40,966 tons of coal floated down to Philadelphia. Some curious person of that time figured out that if they had all

been in one "tow" it would have strung down the river for thirteen miles.

At last there was beginning to be a profit in coal. People were learning how to use it. By 1829 twelve dams had been built to transform the Lehigh into a slack-water canal. White & Hazard had fooled the ironical legislators. They were still going strong. While all the clearance of the Lehigh had been going on and the coal market developed, they had been doing the same thing on the Schuylkill and in 1825 the first coal from the Schuylkill district came by water to Philadelphia. There were 5,378 tons of it. In that same year the Schuylkill canal was complete, and the next year the river carried 16,265 tons to market. A boom had been started in the Schuylkill country. It rose, then fell and with new transportation facilities rose again. The era of canals had begun. It was destined to be far shorter than even that hopeful world imagined, for the trade in anthracite was growing like a weed now. A stronger and swifter burden bearer would soon be due.

To supply demand, to feed this increasing water traffic, the producers had been put to it for means of getting the tonnage down from mine-mouth in the mountains to the riverside. The Lehigh company built its nine miles of switchback from

Summit to Mauch Chunk, and braked its coal down by gravity, taking one extra "Pullman" in every train for the mules which were to drag back the "empties." In several anthracite districts these gravity systems came into use. One by one they were given over, at the last, to tourists and sight-seers. The last to linger, in another and busier century, was the Mauch Chunk road, which was long known as one of the greatest "scenic railways" in the world.

Hauled by a stationary engine up the heights, coasting down the intervening grades on the brake, the gravity cars carried a great and growing tonnage. The Pennsylvania Coal Company's gravity road went out of use in 1885, and that of the Delaware & Hudson Company from Honesdale to Carbondale and Archbold, near Scranton, saw its last service about 1900.

Then too there were the inclines, to get the coal up from the basins in which it was mined, to the higher levels. It was found after rail transportation set in that on some of the roads, where there was a series of heights to be climbed, the power required to hoist the coal up the hills was greater than that involved in getting it to tidewater. The "incline" method was employed in three localities. The Gordon plane started at Gordon at the west end of the Mahanoy Valley, the Mahanoy

plane at the east end of the same basin and the Ashley planes near the west end of the Wyoming Valley. The Gordon was put into operation in 1854; the first car of ore was shipped over the Mahanoy plane on June 2, 1862. The Ashley planes were first used about 1872.

The Mahanoy and Gordon planes consisted of a single plane from the basin to the summit, while at Ashley there are three separate planes one above another and operated separately. Since these devices were the cure for a discouraging obstacle to the early transportation, note of them is most fitting at this point. The method of using the planes is the same in all cases, that is, the trains of coal are brought to the bottom and there broken up into small units, so that only a few cars are hauled up the plane at one time.

At the head of the plane the cars are again made up into trains and proceed to their destination. At the Mahanoy plane the empty cars are lowered down the plane, but at the Ashley plane they return down a track encircling the mountain. The Gordon plane was abandoned about 1900. The Ashley and Mahanoy are still in operation, but all were part of the makeshift that served a new and difficult industry until more efficient equipment should develop to handle its load.

I have said that the story of anthracite is a story

of transportation. The further it proceeds the more clearly this appears, down even to the moment. Seriously considered, there can be no question but that in large measure the slow advance of anthracite in popular use, for many years was due to the mountainous difficulties which confronted the early producers, in getting their stubborn loads out from the tall mountains and precipitous valleys where Nature had dumped them, and by rock-strewn waterways to the places where they were to be put to use.

The period from 1820 to 1830 was a period of education, but it was also the vital time when far-sighted and bold-hearted men were thinking out and preparing new and more efficient methods for solving the problems. Once the superiority of anthracite over every known fuel became fully understood, the demand for it grew from day to day.

Every new step in education brought a new demand for tonnage. When at last the Lehigh and the Schuylkill rivers had by persistent labor been cleared to furnish freeway for a heavily increased supply, came the demonstration, long delayed, of the value of anthracite as a steam coal. In 1829, at the very end of the dependence on river transport, Abram Potts erected a steam engine for his sawmills and set the Schuylkill

anthracite, which was near at hand, to what now seems the trivial task of developing ten horse power.

Up to this time, so far as steam was concerned, anthracite's chief virtue had been its vice. The intense heat had burned out the grate-bars. Potts's remedy was simple and logical. He introduced a pattern of his own, in which the bars were four inches deep in the center and two inches at the ends. In 1835, six years later, Haywood and Snyder, with Potts's grate-bars, were producing thirty horse power at the Spohn colliery near Pottsville, for hoisting coal and pumping water.

The day of big steam power was approaching —of great railway locomotives which would not only carry far bigger loads than ever had been known, but would do it "clean and tidy," so as not to leave a trail of smut and smoke. But these and the factories and the ships all meant digging deeper into the anthracite; and to handle it, for how long or how short a time nobody knew, there were the canals, which had been for some years in process of construction and had been expected to carry with ease the impost of many years. They sufficed relatively for only a little space. Today only two of them linger, and their names, even, have a sound something like that of old and half-remembered tales.

Up to the early thirties, Philadelphia had been the coal shipper's Ultima Thule. Even there the knowledge which creates markets had grown so slowly that the big work undertaken to provide a highway thither for the coal seemed at times like the wildest of speculation. The ambition of anthracite thus far had been to run smoothly down hill to tidewater—specifically to Philadelphia. Now new objectives were appearing. What was needed first was to get to New York and its rich territory, with their increasing multitudes of population and with clear roads to the North and East; and to New Jersey with its deposits of ore for smelting.

The governments of New Jersey and New York, which needed the coal and were going to need it infinitely more, and of Pennsylvania which recognized in this essential commodity a source of riches and stability to the Commonwealth, not only in commerce but in the development of its other great resource, iron, withheld through these hopeful and constructive years no concession which could facilitate productive operation or expedite the movement of coal in quantity to its markets.

There was the further and far greater consideration, that any agency created for the better carriage of anthracite must as a common carrier provide transportation for general commerce,

must stimulate settlement and development of territory, till then remote and idle, and thus add incalculably to the welfare of the State. The coordination of Production and Transportation does not seem to have alarmed the public or the legislatures of that time.

Water, the natural carrier, for so long the "half-broken" pack animal for anthracite, seemed ample to serve the purposes of many years provided it could be made free of peril as well as inconvenience to the commerce. Railroad development would come some day, for the present the canal was the thing. The four canals therefore —Pennsylvania, Schuylkill, Morris, and Delaware and Hudson, were hailed as the bringers of a new era, and a new prosperity, which they proved at once to be. Lowering the cost of carriage, taking the coal in what was for the time ample volume to the iron deposits of New Jersey and of western Pennsylvania as well, and providing routes to New York, the seaboard and the Northern sections, they solved for years the problem of fuel supply and were building up a new country besides.

Since they formed, in effect, the bases upon which the railroad transportation systems for the coal country were later erected, the details of their routes and operations may better be incor-

porated in the later discussion of those enterprises. Slow and archaic as they may now seem to have been, in the light of present haste and staggering tonnages, what they did in their day, to build up the North and Middle Atlantic States, is not to be minimized. The forces which had created them, to meet the needs of that time, replaced them with rails when the growth which they had so great a hand in creating outstripped their carrying capacity. At each step of this development public and legislative sanction was given them.

The "coal roads"—taking their beginnings in the hazardous and uncertain river service which the pioneers had been able to adapt, became a paramount force in the creation of industry and of wealth throughout the territories where they ran, and with the extension which followed and the widening of their frontiers, played a part with which they are not always credited, in the "Winning of the West."

V

Location and Differentiation of the Anthracite Districts—Northern, Southern, Eastern and Western—Geological Conditions in the Several Fields

IF the anthracite beds of Pennsylvania were marked down on a wall map of the United States, they would be an almost indistinguishable "spatter" in so great an expanse. The early exploration of this narrow territory woke the visionaries from their glistening dream of a whole State underlain by solid anthracite of fine quality and immeasurable thickness. They found that while one man had coal his neighbor might have none, that only in three of the anthracite districts was there continuous and unbroken expanse of coal deposit. In some of the departments, notably the Western, Northern and Eastern Middle districts, so called, the wealth lay in beds both short and narrow. In others the deposits were little more than pockets which had been left after Nature finished the titanic work of erosion.

But beginning with the historic and heroic fifty-five tons with which John and Abijah Smith worried down stream to Philadelphia in 1807,

careful records of the Geologic Survey, collected from all possible sources, show that these scattered areas, seemingly so small, have since that day shipped out, to help the world's work along, more than two and one-half billion tons of anthracite. From 1909 they include the "dredge coal" which for the ultimate conservation of resource has been dug from the beds of the Pennsylvania rivers, where it was deposited many years ago, either from the wreck of struggling barges or by the perennial flow of the water. Included also are the recoveries from the culm banks, where in the early days of spendthrift and tenant mining the fine-broken part of the output, the worth of which was not considered and indeed not understood, was thrown aside as waste because there was no market. By recovery and re-mining, old workings and what were waste piles have since yielded up their once-discarded treasure.

But counting all that can be traced, there is small question that besides the local sales and consumption, there are still impressive tonnages of coal which are not traceable. For ten years past, the recorded shipments from the anthracite region have averaged annually in the neighborhood of 70,000,000 tons. Noting the wide divergence of opinion as to how much coal remains—covering a period variously estimated

from fifty to three hundred years—it is quite proper to take off one's hat to a small 485 square miles which could produce so great a volume of riches.

Before passing from these tabulated records of production, or of shipment, it is of interest, in connection with the development of carrying facility discussed in the succeeding chapter, to note the rise in tonnage first when the canals about 1830 succeeded to the river transport, and again toward the end of the decade when the newly born railways began to put steam's giant shoulder to the load. In 1829, when the first canal service began to be available, tonnage jumped from 77,000 to 112,000 tons. Through the first canal decade the load climbed, with some railroad help, to 900,000. From that time on, with the increase of rail development, coal began to travel in millions of tons. In the early seventies, when the canals were passing out, over 20,000,000 tons of anthracite were moving to market.

To lend emphasis to this growth, and to afford clear understanding of anthracite distribution and of the system which was gradually built up to control and transport it, a brief survey of the region and its divisions is desirable. Experiment has shown that the typical properties of anthracite cannot be used for any specific gravity problem,

but each must be worked out separately if accuracy is desired. A series of tests carried on by the coal department of the Pennsylvania Railroad Company gave the average specific gravity as 1.4784 and the average weight per cubic foot as 92.50. Differences are explained by the varying conditions under which coal is found. The general geological structure of the region is a series of basins, with the coal outcropping at one end and along the edges of the basin so that the cover of the same bed may vary within a few miles from several thousand feet to nothing at all.

In a general way, the basins extend in a northeast and southwest direction, the extreme length, as stated in an earlier chapter, being about 120 miles, and the greatest width fifty miles. In its virgin state this whole area was doubtless heavily wooded, but the mountains are now almost entirely denuded of timber. Some of the valleys are well watered and fertile and away from the immediate vicinity of the mines produce sustenance for a large population.

If a polygon be drawn to include the present coal basins and the intervening barrens by a line from the northwestern end of the Northern field to Bernice then east to Mauch Chunk and then to the point of beginning, it is only fair to assume that this entire area once contained anthracite,

which has been eroded from the now barren spaces. Upon this assumption, only about 6 per cent of the original amount remained in the ground when mining began.

In the Pennsylvania Geological Survey, Final Report, Vol. III, part 1, page 2151, Mr. A. D. W. Smith estimates the original contents of the anthracite field before mining began as follows:

Region	Probable Original Content		
Wyoming.....	5,697,380,784	gross	tons
Lehigh	1,635,488,578	"	"
Schuylkill.....	12,175,002,963	"	"
Total.....	19,507,872,325	"	"

According to the United States Geological Survey the total production since the time mining began to the close of 1922 was 2,888,728,473. We have to consider that for every ton of anthracite that has been mined and marketed, one ton has been lost, for until comparatively recent years it was estimated that the recovery was only 40 per cent and that for every ton of anthracite put on the market 1½ tons were lost. Modern mining methods have improved this situation to such an extent that from 65 to 70 per cent of the content of the beds is recovered. Assuming then, that the average amounts to twice the amount of production, the drain upon the beds has amounted

to 5,777,456,946 gross tons and there still remain of minable coal 13,730,415,379 gross tons.

The anthracite region is divided into districts as shown by the table below.

(1) *Geologically and geographically* there are the Northern or Wyoming-Lackawanna; the Western or Loyalsock; the Eastern Middle or Lehigh; the Southern or Pottsville and the Western Middle or Shamokin districts. The geographic subdivisions given by the second Geological Survey of Pennsylvania have no special geologic significance, but are useful reference points in the minute descriptions of the anthracite field contained in the reports of that survey. They are of interest in showing the derivatives of certain trade names of coal, such a Lykens Valley, Red Ash, Lorberry, Trevorton, etc.

(2) *For mine inspection purposes.* The number and designation of the districts have varied as the number of inspections has varied. Eight districts existed in 1902. In 1910 there were twenty. The numbers and boundaries of the districts are changed from time to time. There are now twenty-four inspection districts.

(3) *The Labor Districts.* These, established by the United Mine Workers, agree fairly well with the trade districts used in classifying output, as the following table shows:

TRADE AND LABOR DISTRICTS IN PENNSYLVANIA ANTHRACITE COAL FIELD

Trade	Geographic	Labor
Wyoming Region	Northern field and Bernice Basin	No. 1
Lehigh Region	Eastern Middle field and Southern field east of Tamaqua	No. 7
Schuylkill Region	Western Middle field and Southern field west of Tamaqua	No. 9

Geologic Conditions of Anthracite Field. Since the methods of mining, the transportation facilities and the division into three trade districts were all more or less predetermined by geologic conditions, a knowledge of the geological structure of the field is essential.

Northern Basin. The Northern, or Wyoming-Lackawanna, basin contains 176 square miles. It is 55 miles long, six miles wide. The upper end of the basin is the Lackawanna Valley, through which the Lackawanna river flows until it empties near Pittston into the Susquehanna. The latter river breaks through the hills from the north just above Pittston and flows through the Wyoming Valley to Nanticoke, where it leaves the valley by an abrupt northern turn. These breaks of the Susquehanna through the mountains give natural and easy transportation outlets to the north and west, but the railroads going east and south must surmount the Pocono mountains—about 2,000

feet. The valley surface is undulating and the elevation decreases from 1,500 feet at Forest City to about 400 feet at Shickshinny. The landscape, once extremely picturesque, is now sadly disfigured by culm heaps, coal breakers and the denudation of the hills. The principal cities are Scranton and Wilkes Barre; smaller towns are Pittston, Kingston, Plymouth and Nanticoke.

From Forest City to Pittston and from Pittston to Nanticoke, north of the Susquehanna, the coal measures have dips of 10° to 20°, while between Pittston and Nanticoke, south of the river, the dips are steeper, ranging from 60° to 70°, and near Glen Lyon the measures in places are overturned and badly broken. There are numerous folds and flexures in the beds. The Northern basin is deepest (2,200 feet) midway between Wilkes Barre and Nanticoke.

A notable feature of this field is a preglacial valley of the Susquehanna, extending from Pittston to beyond Nanticoke, that is now deeply filled by sand. In places this valley cuts out the upper coal beds and its irregularities add an element of danger to the mining, since the waterfilled sands will quickly fill a mine which breaks into them. The second geological survey from measure of 891 sections, estimated that 82.8 per cent of the total coal in the Wyoming basin may be market-

able. The remaining 17.2 per cent are interbedded slate, shale and other refuse.

Loyalsock and Mehoopany Divisions. (Also called the Northwestern Basin.) Twenty-five miles northwest of the main Northern Basin, includes several small, detached coal areas. Its output is included in that of the Wyoming region.

Eastern Middle Basin. Smallest of the geographic divisions. Lies fifteen miles south and southwest of the western end of the Northern Basin, from which it is separated by a mountain range and a valley. It is 26 miles long, ten miles wide, its total coal area 33 square miles. The surface is a barren, unlovely plateau, from 1,400 to 1,700 feet in height. The mountains are bare, there are no large streams and during dry seasons water supply for mining is scant. Hazleton is the chief town. The structure is a series of anticlines, with broad, flat crests and shallow intervening basins 500 to 600 feet deep. This folding gives a large extent of outcrop and together with the great thickness of the seam, especially in the Mammoth bed, has permitted the taking of a large amount of coal by stripping or open cut mining. About 75 per cent of the total thickness is held marketable.

Southern Basin. Extends seventy miles west from Mauch Chunk, on the Lehigh River, to

Dauphin, on the Susquehanna near Pottsville. It is eight miles wide, but tapers to both east and west, and on the west divides into two long, narrow basins. It is the largest of the fields, with 181 square miles, Panther Creek drains the eastern end; most of the drainage is southward through the Schuylkill. The field is bounded on the south by Sharp mountain, which extends from the Lehigh to the Susquehanna. The surface is broken and rugged with general elevation above tidewater 600 to 1,800 feet. The principal towns are Pottsville and Tamaqua.

This field contains a number of connected basins which grow deeper from north to south, until along the foot of Sharp mountain the beds go down very deep, are highly upturned and greatly contorted. The Pottsville conglomerate in this section is very thick, ranging from 1,000 to 1,475 feet. It is made up of coarse materials and contains a number of valuable coal beds. At the point where the main field subdivides there are six Lykens Valley beds in the conglomerate, each three to ten feet thick. The coal measures proper, above the conglomerate are at least 2,500 feet thick, and at least twenty different coal beds have been worked. Seventy-two per cent of the coal is believed marketable.

Western Middle Basin. This deposit is 36 miles

long, four to five miles broad. It contains 94 square miles, with two distinct divisions—the Mahanoy and Shamokin basins. The first extends from Dalano 25 miles westward to a point four miles west of Locust Gap. It is two and a half miles wide near Shenandoah and 2,000 feet deep to the base of the Buck Mountain bed, the lowest bed in the coal measures. The Shamokin basin runs west 30 miles from Centralia. It is three miles wide near Shamokin and 1,800 feet deep to the base of the Buck Mountain bed. The basin is traversed by ridges nearly as high as the surrounding mountains. The whole picture is one of rugged barrenness. The beds incline steeply, there has been much folding, sliding and displacement, which has crushed the coal in many places and mixed it with slate and bony coal partings. There is 23 per cent refuse in the coal.

The maximum thickness of the portions remaining of the coal measures are: Northern field, 1,800 feet; Eastern Middle, 700 feet; Western Middle, 1,000 feet; Southern, 2,500 feet. The coal measures contain coal beds throughout their whole extent, varying in thickness from mere traces to the Mammoth bed, which has a thickness of 50 to 60 feet over wide areas. In general, the lower 500 feet of the coal measures, up to the top of the Mammoth bed, contain the thicker

deposits. The beds are separated by intervals varying from a few to several hundred feet, but a barren interval of more than 200 feet is rare. The rocks intervening between the coal beds are: (1) Brown or gray sandstones, varying in texture and merging into fine conglomerates; (2) shales varying in hardness and color; (3) black, carboniferous slate or shale; (4) fire clays, many underlying coal, but some not near a coal bed.

In the Northern field different names are given to the same bed in different sections. No successful attempt has been made to correlate all of the beds of the Northern field with those of other fields, but the Red Ash, Skidmore, and Baltimore beds of the north are accepted as being identical with the Buck Mountain, Skidmore and Mammoth.

This then is the treasure house of anthracite, its riches upturned, overturned, jumbled and hidden and mixed with many causes of disappointment and financial loss. Buttressed by grim and evilly placed mountains, with torrent swept canyons for gangway, it bade mankind a surly defiance. And man has won.

VI

Beginnings of the "Coal Roads"—Acts Encouraged by Legislative Sanction in Early Years Afterwards Condemned as Wrong and Even Criminal

THE "canal period" of anthracite transportation has been set down at seventy years. It may better be said to have lasted from 1830 to 1875. Long before that time the railroad systems which arose to supplant it were well on their way to the great development which made them so formidable in the half century which followed.

By the time when canal transport took the place of uncertain and hazardous river traffic, the anthracite regions had been explored and defined. The concentration of hard coal into a comparatively small territory was known. Its uses were fairly well proven. In providing the carriage for which they were created, and so building up a demand which they were in the end unable to supply, the canals actually shortened their own utility and precipitated the call for rail transport.

The four canals of importance, which carried the greater burden of the tonnage were:

(1) The Pennsylvania Canal, running from Nanticoke to Sunbury and thence by the Chesapeake and Tidewater canal to Port Deposit, Md.;

(2) The Delaware and Hudson Canal, incorporated 1823, extending from Honesdale, Pa., to Rondout, N. Y., a part of Kingston, where the coal was transshipped for passage down the Hudson River to New York;

(3) The canal of the Lehigh Coal and Navigation Company, from Mauch Chunk to Easton and thence by the Morris Canal completed in 1831, to Perth Amboy, or by canal along the Delaware to Philadelphia;

(4) The canal completed in 1825, extending from just below Pottsville, and parallel to the Schuylkill, to Philadelphia.

The canals have practically disappeared as factors in the transportation of anthracite, for while the Lehigh Coal and Navigation canal is still in operation it is maintained at a loss and the amount of coal it carries is a small part of the total output. The Delaware and Hudson was abandoned in 1899 and the canal beds sold to the Delaware Valley and Kingston road, a project of the independent operators.

What really shortened the life of the canals and hastened the advent of the "coal roads" was the swift advance of anthracite as a fuel in the smelt-

ing of iron ore. The years from 1801 to 1840 have been called the "charcoal period" in iron making, although as before pointed out, charcoal had been for centuries the metal worker's fuel. An apparently inexhaustible supply of ore was at hand. The great work of opening up a new country lay ahead. The time had arrived for the use of mineral fuels in the blast furnace. Anthracite was the first.

In 1830 a Doctor Geisenheimer, one of the German colonists who played so great a part in the settlement and upbuilding of eastern Pennsylvania, first succeeded in making "pig" with anthracite. Again the strangely slow step forward. In 1836 the Franklin Institute in Philadelphia offered a prize for the first twenty tons of pig iron so made. So many people did it that the prize was never awarded, and anthracite grew so fast in favor as a blast furnace fuel that before 1855 it had practically driven charcoal from the field. By 1875 it had in turn begun to give way to coke. The anthracite period in the blast furnace business is almost precisely coterminous with the life of the canals.

The following table, showing how anthracite succeeded charcoal as a blast furnace fuel and was in turn succeeded by coke, is taken principally from "Iron in All Ages," by the late James M. Swank. The figures represent quantities used as blast furnace fuel:

Year	Charcoal Short Tons	Anthracite and Coke Short Tons	Coke Short Tons	Remarks
1854	342,296	339,435	54,485	Era of charcoal
1855	339,922	381,866	62,390	Anth. leads charcoal
1869	392,150	971,150	553,341	Coke leads charcoal
1875	410,990	2,908,046	947,545	Coke leads anthracite
1880	703,522	2,448,781	7,154,725	Era of coke
1900	339,874	1,636,366	11,727,712	Era of coke
1910	444,088	726,972	*29,408,935	

In the business of iron manufacture anthracite wrought great and immediate advance. Its influence was first felt in eastern Pennsylvania, and here too its permanent effects were greatest. Anthracite furnaces went up everywhere; charcoal furnaces were altered to allow the use of anthracite. In six years the number of anthracite furnaces rose from nothing to 121. How quickly the manufacture in this section rushed toward its maximum under the impetus of the new fuel is shown by the fact that forty years later—in 1876—out of the 225 anthracite furnaces in the country, Pennsylvania had achieved 161.

Other facts widened the tonnage requirement for anthracite during this iron age. The anthracite furnaces not only increased in number, but they were built in sizes which made the old charcoal furnaces—made in one size for a century—look like toys. The blowing engines also were made with greater power, the best giving a

* Includes a small quantity of bituminous coal used raw.

blast pressure of from five to eight pounds per square inch. This in itself was revolutionary, as some of the old charcoal furnaces were operated with a pressure of only a fraction of a pound. Growth in furnace capacity brought a huge demand for ore, first felt in the Lehigh Valley.

This section, where there had been almost no smelting, became within a short time the great smelting center of the United States. The ores employed were chiefly the local brown ore of Eastern Pennsylvania and the magnetite ores of New Jersey, for both of which the canals provided ample and increasing carriage. The limonite ores of the Lehigh had hardly been developed at all before 1840. The increase in their production under the spur of anthracite, raised a new and almost unknown district to a position of commanding importance in the iron industry of the country. The introduction of anthracite as a furnace fuel also stimulated production in all other ore regions of the State which could be reached by the new fuel. The steps in development of the anthracite industry and of the transportation systems which owe their greatness to coal and iron are simple. With increasing demand the coal regions grew, in population and activity. Towns meant shops and general merchandise, which in turn spelled more transportation. While the

canals lugged the early tonnage, railway expansion, in some cases with concomitant mine ownership, was moving speedily toward the day when the railroads should monopolize the business of haulage, and the canals, their purpose served, were to lapse into idleness and final abandonment. A new world was on the way.

The genesis of the "coal roads" seems to have been in the more or less spectacular switchback which Josiah White and Erskine Hazard—as the Lehigh Navigation Company—built to replace the insufficient and decrepit turnpike over which they had teamed the coal of Mauch Chunk to the river on its way to Philadelphia in the childhood of coal production. This was the coal over which Philip Ginter stubbed his toe. There were systems, notably the Reading, which for a long time served as carriers only, giving no thought to the ownership of coal lands. White and Hazard, however, earliest of the pioneers, seem to have visioned the opportunity which was to develop from coordinate operation both as miners and carriers. Their initial movement held the germ of the "coal road" idea, which in the fulness of its growth spread into far places and with leases, purchases, transfers, branches, cooperative working agreements on the one hand and ownership of vast tracts of coal land on the other, sat in the

last years of the Nineteenth Century and the early years of the present one as effectual monarch of all the anthracite, surveyed and otherwise.

But whatever may have been the right or wrong of the "coal roads," whatever abuses may have arisen in later years to warrant popular opprobrium and the flood of hostile legislation and legal attack, two things are clearly legible in the history of those early days when the anthracite railway systems were being born: First, that people and legislatures alike saw in the establishment a sure and competent instrument for getting the coal to market—to the cities for heating, to the ore deposits for the making of iron and the development of the wealth and resource of the State; and second, a guarantee of conservation which even then the slack and destructive methods of the tenant miners had shown to be a vital need for the future.

Probably no one will be naive enough to acquit the "coal roads"—or the men who built them—of a gainful purpose in the accumulation of coal lands; neither will anyone find in the enactments of that time aught to indicate that the service these roads were to render was not held to be worth a large consideration. New York, New Jersey and Pennsylvania were of one mind. They invited and urged acts which were after-

wards held to be objectionable or even criminal. Other times brought other men and other minds, all of which will be shown in due course. It is needful here only to rehearse briefly the steps in the creation of these systems, and the way in which they were devised to push forward all the frontiers of a country which was growing as no country in the world had ever grown. The first charter granted for railroad construction was to the Beaver Meadow Railroad and Coal Company, which afterward became a part of the Lehigh system, giving it the right to exercise privileges "necessary to the perfect completion of said railroad and carrying on a business of mining, transporting and vending coal." This charter set the key for all the subsequent legislation by which the anthracite roads were created and fostered. The ownership of lands and the mining of coal was contemplated from the beginning and was specifically conferred in all the legislation for decades. Progressive enactment was plentiful by which the way was prepared for the erection of coordinate systems for mining, transportation and marketing.

The early granting of rights to the Lehigh Coal and Navigation Company to improve navigation in the Lehigh river for the better carriage of the coal was followed in 1837 by sanction of a road

from Wilkes Barre over the divide to slack water navigation near White Haven. In 1863 and 1864 authority was given for the extension of the road down the valley of the Lehigh and across the Delaware, to connect with any other railroad built or to be built in New Jersey. In 1868 the company carried its road across the Delaware and operated it as the Lehigh & Susquehanna until in 1871 it was leased to the Central Railroad of New Jersey.

The Delaware & Hudson likewise had early beginnings. In 1823 the Pennsylvania legislature gave to Maurice Wurts, a pioneer in river transport and a large owner of coal lands, broad rights to improve the River Lackawaxen; following this the New York legislature, to secure a channel by which the City of New York and other parts of the State might receive a supply of coal, gave Wurts right through the Delaware & Hudson Canal Company to form a communication between the two rivers, passing through the counties of Orange, Sullivan and Ulster. The Pennsylvania legislature authorized the company to acquire 5,000 acres of coal lands, which acreage was later largely increased, and to construct railways for transportation of the coal. Railroad charter was also secured in New York, in 1867, and right to build branches and extension of its lines was

thereafter granted in both States. The canal was abandoned in 1899 and the company changed to the Delaware & Hudson Company.

The expansion of Lehigh went on. The old Beaver Meadow Company, having got rights to hold coal lands, was merged in the Lehigh Valley Railroad Company in 1864. The Hazleton Coal Company incorporated in 1836 and by divers enactments secured land and mining privileges. In 1839 it took over the rights of the Laurel Hill Company to build a road from Hazleton to the Lehigh River. These enterprises also were merged in the Lehigh Valley Railroad. The Delaware, Lehigh, Schuylkill and Susquehanna Company was incorporated in 1846 and in 1853 changed its name to the Lehigh Valley Railroad Company. Under legislative authority the Lehigh company bought the stock of various coal companies. In 1871 the Green Land Company was formed; in 1875 it was merged with the Luzerne Coal and Iron Co., and in the same year the title of the merged companies was registered as the Lehigh Valley Coal Company. All its stock was owned by the Lehigh Valley Railroad Company. This stock was increased to $9,465,000 and its lands, fee and leasehold, totaled 33,000 acres, about ten per cent of the coal lands in the State. The building of this organization took about sixty years.

Later the system was completed by purchase of the stock of Coxe Bros. & Co., Inc., for $17,440,000. This was the largest independent interest and had an annual production of 1,100,000 tons. It also owned the entire capital stock of the Delaware, Susquehanna and Schuylkill Railroad Company, which served large independent mines in connection with the Reading, Pennsylvania and New Jersey Central.

The Delaware, Lackawanna & Western system had its beginning in the incorporation in 1832 of the Ligget's Gap Railroad Company, to construct a road from Providence, Pa., (now Scranton) north to the Susquehanna River at Great Bend. The charter gave the right to hold coal lands and mine and sell coal, a right which was confirmed and extended in the later years of the Company's expansion. For fifteen years the Ligget's Gap project slept. After the Erie had been built the firm of Scranton, Grant & Co., which had acquired large coal and iron rights in the neighborhood of what is now Scranton, waked it and enlisted a large volume of New York capital. They built the Ligget's Gap road and then started out on a large scheme of expansion, in which many of the big coal owners joined. A connection and trackage rights were secured from the Erie, but meantime the Cayuga and Susquehanna was got and

rebuilt and the day after Ligget's Gap was open coal started moving from Ithaca, where by way of Cayuga Lake and the Erie Canal there was freeway to western New York, and by the Erie to tidewater at New York.

The expansion was rapid and masterful. They built the Cobb's Gap and Warren Railroads in Pennsylvania to carry them to junction with the New Jersey Central, then merged the whole under the final title of Delaware, Lackawanna & Western. In five years they had a direct route of 146 miles to New York.

The wider west was coming on. The objective was strong transport avenue to the Great Lakes. First the Syracuse and Binghamton and the Syracuse and Oswego were absorbed and solidified and a number of local feeders taken on, with new contact with the Erie Canal. In 1883 the line was built from Binghamton to Buffalo and Black Rock. Then attention was turned again to the east.

Coal feeders had been built and bought in Pennsylvania, small stretches of rails, valuable in the completion of a mining, selling and carrying system, had been taken over in New Jersey, until the D. L. & W. system, with one foot in the Great Lakes and the other in New York Harbor, owned or controlled a complete network of railroad in the most populous industrial section of the east,

both for the collection of coal and its distribution. And all the time it had been acquiring, both by purchase and lease, thousands of acres of anthracite, from which its cargoes were mined down to 1921, when the last bell sounded for dissolution of the great coal combinations so sedulously builded.

The Central Railroad of New Jersey has no thrilling coal history. Its records present no picture of stern battles among the mountains and down the turbulent Pennsylvania waterways. From its incorporation in 1847, as the Somerville and Eastern Railroad, it has been a pacific trader, a carrier in fact as in name, a banker and a bondholder, assuring its cargoes through the gentle leverage of finance, not tempting criticism by the actual ownership of coal. In 1849 its title was changed to the present form and to secure carriage of the coal produced by the Lehigh Coal & Navigation Company and two other companies merged as the Lehigh & Wilkes Barre Coal Co., it leased, way along in 1871, the Lehigh & Susquehanna Railroad, which was owned by the Lehigh Coal and Navigation Co. In 1874 it had right from the New Jersey legislature to guarantee the bonds of coal companies along its leased lines in Pennsylvania, and various acts of similar nature were all amended in 1896 into a grant of power

to hold stocks, bonds, securities of any corporation of Pennsylvania, and to exercise all the rights thereunder. So it carried a huge burden of coal. In the end it and all its facilities were leased to the Reading, and afterwards again "segregated." The Reading, by way of contrast, has had a barometric story. Chartered in 1833, early in the canal period, to build a line from Reading in Berks to some point in or near Philadelphia, it confined itself for almost forty years to the business of transportation. The strikes in and after 1869 demoralized its traffic. In 1871 it went into the coal business, with 70,000 acres of coal land, held by a subsidiary, the Philadelphia and Reading Coal and Iron Co. For the acquirement of these lands the Laurel Run Improvement Company had been created, then changed to the title just mentioned.

For a time the lands were leased. Two years of "tenant farming," with its traditional assault on the easy profits and destruction of resources, brought wisdom. Two years later Reading owned and was working 37 of the 80 collieries on its lands, and waiting for the leases on the others to expire. Nearly twenty years later both the railroad and the coal company passed into receivership. In what was known as the Reading Reorganization of 1896, both interests became the property of what was known as the Reading Com-

pany, a consolidation which when the final storm of public censure broke a quarter of a century later came in for criticism of acts perfectly legal when they were performed.

It would seem that the Lehigh, the D. L. & W. and the Reading owned or controlled, in the end of the century, some sixty per cent of anthracite. There were other roads too, which had longish titles, among them none with so grandiose and so melodramatic a history as the Erie. Incorporated in 1832—the period of great expectations—it passed through a series of reorganizations and changes of title through more than sixty years. In 1838 the Pennsylvania Coal Company had rights from the Pennsylvania legislature to mine, transport and sell coal, to purchase and lease coal lands and build railroads. Periodical enlargement of these rights culminated in 1853 with the permission to connect its tracks with the Erie or any other road in New York or New Jersey, and to consolidate the interests as it desired. Preparatory legislation having been passed in New York, it built its road from the gravity at Hawley, to join the Erie between Oxford Station and Deposit in Broome County. The Jefferson Railroad was chartered in 1851, from Carbondale to the Erie at Lanesboro, to carry out the Hillside Company's coal from the Lackawanna field, and in 1869 this was leased to the Erie. The Hillside Company

had been organized to own and mine the coal, also to produce iron ore and lumber, and its stock also went into the Erie safe. Many more thousands of acres of coal land were thus added to the "reserves."

In 1881 four railroad companies in New Jersey and two in Pennsylvania were consolidated as the New York, Susquehanna and Western, and the following year connected with the Delaware, Lackawanna & Western near Stroudsburg. The Susquehanna was to build lines and collect coal in Pennsylvania, the Lackawanna was to carry it. Ten years later the Pennsylvania Anthracite Coal Company with proper change of title, became the property of the Susquehanna, which later joined with the Wilkes Barre & Eastern to build a road to Stroudsburg to take up the tonnage formerly carried by the Lackawanna. In 1896 the Susquehanna Connecting Company was created to take over the feeders in Pennsylvania, which then were leased to the Wilkes Barre & Eastern.

Under the law of 1869 the Pennsylvania Railroad Company began buying stock of coal companies operating along its lines. It became in course of time sole owner of the Susquehanna Coal Company and Summit Branch Mining Company, and one-third owner of the Mineral Railroad and Mining Company. Forty years after, foreseeing the tempest on the way, the Pennsylvania, after

four years of effort and by means of some intermediary incorporation, got M. A. Hanna & Co. to take its anthracite properties off its hands and went definitely out of the coal business.

One factor more remains, in the well cemented enclosure which practically within a period of sixty years was built up around the visible and invisible supply of anthracite. The channels of transportation, constructed to take the place, as I have said, of the long outgrown canals, now led to all the world.

In 1880—rather late in the day—the New York, Ontario & Western was born. It bought under foreclosure the New York & Oswego Midland, which ran from Middletown to Oswego, with three small branches to Ellenville, Delhi and New Berlin. It wanted entry to New York, and through a special incorporation, built an extension to Cornwall on the Hudson, thence to Weehawken. The West Shore, building from Cornwall to Buffalo, had running rights to Weehawken. In 1886 the West Shore was foreclosed and the Ontario lease from Cornwall passed to the West Shore which was leased to the New York Central. Up to 1890 the Ontario had no line into the coal fields. Coal owners chipped in, the Ontario, Carbondale and Scranton was incorporated, having connections at and near Scranton with the Delaware & Hudson; Erie; Delaware, Lackawanna &

Western; Lehigh Valley, and New Jersey Central. It enlarged its docks and trestles at Oswego, and acquired dock facilities at Cornwall and Weehawken. Later the Poughkeepsie Bridge Route was completed; from the junction at Campbell Hall, Ontario could carry its Scranton coal all over New England. Then it bought the capital stock of the Scranton Coal Company, and the Elk Hill Coal and Iron Company, including their bonded indebtedness. It was all set for a long and prosperous coal carrying career.

VII

A Panorama of the Kingdom of Coal—Production of Anthracite an Intricate, Costly Undertaking—How the "Realization" of the Mine Producer Figures Out

TRAVELING with your white collar, in the cleanly comfort of the above-ground man, by any of the railroads which invade or traverse the anthracite country of Pennsylvania—even the small feeder lines which penetrate to out of the way places—you are forever conscious of coal. It is everywhere. It is coal that is whisking you along. Endless ranks of loaded coal cars on the sidings, long, heavy-laden, black trains of "gondolas" groaning up the grades or jolting down the inclines; huge culm piles towering in the shadow of factory stacks.

It is the kingdom of Coal. In bare and rocky hillsides yawn the mouths of tunnels, some of them abandoned and brush-grown, others with signs of production. On like hillsides cling great buildings, like grim castles of old. Here and everywhere the great business of anthracite goes on.

And yet there isn't so much noise about it. One

doesn't realize, without a certain mental effort, that down a thousand feet or less—or a great deal more—under the barren hills and the boulder-paved valleys, under the smudgy buildings and the hurrying trains, under flowing streams and long bridges, even under towns and villages, the miners, like moles, a dingy army of them, are taking out the coal which after æons of waiting is on its way to market. At stops sometimes you get the rumble of great "breakers" on the hills; at whistle time you see crowds of blackened men moving toward villages. The mere getting of the coal is a continued story and a motion picture in itself. Few of the millions who burn it know what goes on before the local coal dealer dumps it in the cellar, or they'd take better care of it and learn how to use it. Very few people know that, either. If they did, nothing would come out of the furnace but ashes that you could throw away. Sifters would be extinct and the care of the heating system robbed of half its horrors.

From the maps you may know the anthracite basins already told about, and the railroad systems which carry their output to market. But maps cannot provide a picture of the mining and preparation of coal, a difficult and complicated process which for over a century has gone on increasing in intensity and magnitude until, to meet growing needs, the grimy men underground have dug and

drilled and blasted out as high as 80,000,000 tons in a year.

In the beginning, when the first few tons of anthracite bumped down among the rocks of the Lehigh to beg its way from door to door in Philadelphia, there were no real miners in Pennsylvania. A man who found coal on his property just went out with a pick and a crowbar, tore some loose, picked out the prettiest pieces and threw away the rest. He made it look as nice as he could and peddled it, like a small farmer trying to sell the housewives eggs, tomatoes and butter. When people found out after years and years, that the stuff would burn in a stove, and wise men with business heads began to see a commerce in it, the word went back to England. Some Welsh and English miners came over. The early mining in Pennsylvania followed the Welsh and English methods.

But there was a lot they didn't know. Like foolish men who come into large fortunes, they had no thought of the future. Even after the demand had grown and they began to sink shafts and do what they thought was systematic mining, they simply took what was easiest, and let the rest go. To get at thick veins where they could get out a lot of high quality, they smashed up the thinner ones like spendthrifts, just as the timber butchers of the Northwest have slaughtered fine

fir to get at the "big sticks." Wiser heads, in these days of dwindling supply, are working every inch, combing the ancient waste-heaps, dredging the streams, trying to scrape up what the early wastrels threw away. They have found ways to burn the finer sizes, to get power, or steam from it; they have invented grates and flues and furnaces, they have washed and cleaned and sifted and graded. They have recovered millions of tons of good coal from those decades of waste, but it is only a small part of what was foolishly sacrificed.

Mining is a tricky as well as chancey business. There are many distinct systems, each to suit some ore or other mineral, or some special rock formation or condition. Engineers have worked these out with care over a long time. But digging the underpinning out from under a town or a countryside has to be done with sense and care if you don't want the county to cave in. Theory may be perfect, too, and then fall down because when Nature in her primordial fits jumbled up the rocks she left a "fault" somewhere, or a watercourse, which made all the calculations of the engineer and the caution of the miner of no avail.

Mining anthracite is a different thing from mining bituminous coal, of which there are 400,000 square miles in the United States. Sometimes you can scrape up bituminous on the surface of the

ground with a big steam shovel. Even underground you can get it about twice as fast as you can the "hard coal." The records of a miner's day's work show that. That's one of the things that make bituminous cheaper. Mining anthracite is a good deal more like mining copper or silver —perhaps a cross between these and the work in bituminous.

The mining of copper in Arizona or Montana, for instance, is mostly done by sinking a shaft, running a "drift" off from that where veins are indicated, then side passages or "tunnels" from these, on the various levels, hunting for the ore. It is like the elevator shaft, floors and corridors in a big hotel. Even there faults occur, and water happens anywhere; but the "country rock" so called is hard granite. In Pennsylvania the rock between the coal seams is sandstone or shale. There's a big difference. But they have tried the "drift and tunnel" system of mining in the anthracite region. In the early days they did a good deal of it in the Wyoming district, but gave it up and followed what is known as "slope mining," changing from that again as they got into the deeper levels.

Plans of battle have to be changed at a moment's notice to meet unexpected conditions. Mining is a battle if anything is. The plan of battle—the method of mining—in the anthracite region, is

what is called the "room and pillar" method; but it has had to be modified again and again to meet local considerations. In the early days, when they really began to mine, they adopted the room and pillar method, but they didn't follow it conscientiously or systematically as the great companies have since done. They were lazy and eager to "get rich quick." As I have said, they took the easiest way, removed the most accessible and most profitable coal and messed up the rest so it could never be recovered.

If a thin seam overlay a thick seam, with a thin layer of rock between, they mined the thick ore and left the roof to fall. The thinner seam of coal was lost in the "cave-in" that followed. And since in those hasty and haphazard days they kept no maps of the workings, recovery has had to be done as the compassless Maine fishermen sail their boats—"by guess an' by God."

Here is the final testimony against them. It is well known—to miners, anyway—that it is easier and cheaper to mine a bed six to eight feet thick than one that is either thicker or thinner. It is what a man can reach on a uniform level. The old time miners, working in a vein fourteen to twenty feet thick, would cut out eight feet and leave the rest. What became of it they didn't care. There was plenty.

"Room and pillar" doesn't need any defining.

It means just what it says. It is simply cutting out the coal with drill and dynamite, to make a room, and leaving pillars to hold up the structure overhead. In the bituminous districts the same system is followed, except that in anthracite mining it has been the custom to work out the rooms to the boundary of the mine, leaving the pillars standing until the boundary was reached, and then withdraw the pillars or such portion of them as could be reached, while working from the boundary toward the mine opening.

In some parts of the region it has been found necessary, since wise and systematic mining prevailed, to leave very wide pillars. This was specially true in the Wyoming Valley for two reasons: first, because the Susquehanna River flows over the coal measures and second, because the rock floor of the valley is deeply covered with quicksand. Serious disasters in the early days taught the Wyoming miners to leave their pillars of ample dimensions, to keep the structure firm and prevent the quicksand and the river water from flowing into the workings.

In the main, the early miners didn't have to bother their heads about water because the business of mining almost down to 1840 was confined to operations above water level. At that time, many of the upper beds having been worked out, new systems were introduced to get at the lower

beds and inclined planes and pumping engines resorted to for "unwatering" the lower levels to get at the coal.

According to the late G. M. Williams, who was for many years a mine inspector for the Wilkes Barre district, the first attempt at really systematic "room and pillar" work was made in the Wyoming district about 1835. At that time the "rooms," or "breasts," were made ten yards wide and the pillars five yards, the "breasts" being all opened from a single gangway or entry. The breasts were worked generally with very thin pillars and as a result little pillar coal was saved.

Very little change occurred in mining methods until the passage of the mine law of 1870, which required that all mines be better ventilated. The miners in the strikes of the preceding year had demanded better working conditions. This law, first of a long succession of mining enactments, to which later reference will be made, called for the abandonment of the old "single entry" system. Under the "double entry" system provided, an airway was driven parallel to the gangway or haulage way, a pillar of coal being left between the two entries, causing the intake and return air currents to travel in separate passages.

At first, the natural movement of air was considered sufficient, but this was followed by furnace

ventilation and this in turn by fans. The first record of any fan installation in the anthracite district appears in an old book, "Coal, Iron and Oil," published in 1866, which says:

> "The use of the fan as an exhauster appears to have been first sucessfully applied in the anthracite region at Locustdale, near Ashland, Pennsylvania, by John Louden Beadle, a mining engineer of much practical experience and ability. It was introduced in 1857 and 1858 after a long series of practical experiments in blowing and exhausting the air, and was adopted as the result of these experiments. This fan, as applied, is the simplest in use and most effective. With half the expenditure of power and means required in the French suction apparatus, it produces better results."

It is recorded too that D. W. Snyder of Pottsville erected an exhaust fan at St. Clair in the Fall of 1866, and that another, a blowing fan, was installed at Williamstown. One George Parrish had a fan working in the Wyoming district in 1867 or 1868, but mine fans did not come into general use till after the law of 1870, and even after that furnaces were still used.

The day of better methods was at hand. Mediaeval ways of doing work were giving way

to invention and new intelligence. The development of the system of double entry, which was inaugurated following the mine law of 1870, resulted in a plan for rooms opening from the upper of two passage ways. This is still the prevailing method, but it has been improved by a decrease in the width of rooms and increase in the width of pillar; also a more strict adherence to the width of pillar and a systematic working of the overlying beds, so that pillar comes above pillar and breast above breast.

How deep the mine and pillar method can be depended on to carry a working in the anthracite region has not yet been determined. Mining men think it will be necessary some day to adopt the "long wall" method, which gives a continuous line of support, but at the present time mines are being successfully operated in the old manner at a depth of 1,700 to 1,800 feet. The change which has been made from pillars ten to fifteen feet and breasts thirty to forty feet wide, to breasts about twenty and pillars fifty feet wide has involved greater expense for mining on the advance, but the ultimate recovery of coal with the wide pillars is much greater.

The most conspicuous and most radical innovation in room and pillar work has been the filling of the worked-out rooms with "culm," the refuse produced in preparation of the coal for market.

In any mining district where the old workings are extensive, there is always a wonder as to just when the bottom of things is going to fall out. It isn't so bad in the country, where the population is mostly cows, but when the city of Shenandoah began to wobble over an old mine chamber of the Philadelphia and Reading, and the worthy burghers got into bed at night with their boots on expecting to be "down in a coal mine, underneath the ground," along with the City Hall and the Public Library, before breakfast time, something had to be done.

The company ordered all its engineer corps to begin thinking. One man had an inspiration, just like that. They filled up the old cavity, which was about two hundred feet square, with refuse from an adjoining coal pile. The town stayed where it belonged. That was in 1887. Everybody was so pleased that they forgot all about it till 1892. Then the custom became general, not only to keep the old works from caving in, but to seal off mine fires. It had a ledger value, too, for after the filling had settled and hardened, it became a firm support. Then they could go in and take out the original pillars for coal. It was cash.

The high cost of anthracite is very largely a matter of labor. It is not, like bituminous, ready for use when it is broken loose from the bed and

taken to the surface. The greater part of the work, to fit it for the best service, is still to be done. Of the 150,000 men employed in anthracite production, only about 40,000 are actually mining coal. The other 110,000 are employed inside and outside the mines, loading and hauling the coal, driving and maintaining gangways, and preparing the coal for market.

The early experimenters in Pennsylvania couldn't make anthracite burn at all. They learned how afterward—by accident. The reason lay in the nature of it. It is compact, and it contains very little volatile matter; this too is what makes it so clean and so smokeless. If you watch it you will see that it burns gradually, from the surface inward, and does not break up in burning, like bituminous coal.

A crust of ash forms over the surface of a lump of anthracite and a free, strong current of air must have access to the coal if it is to continue to burn. This is less true if the coal is confined so the heat escapes very slowly. For that reason anthracite will smoulder or even burn fiercely, in stock piles or in the mine. In a furnace, which is constructed to allow the heat to escape and warm the house, it burns best when the draft can be distributed most evenly. That is why most heat and cleanest consumption are got by having it broken into uniform sizes. Long, patient experi-

ment has taught what sizes are most serviceable for divers purposes and in various kinds of furnaces and stoves.

It took a long time to get this knowledge, and a still longer time to take full advantage of it. In the beginning, knowing nothing, they sent the coal to market without any preparation. As late as 1840 John G. Hewes, of Pottsville, a coal man, saw people in the streets of Philadelphia, with sledges, breaking coal up into sizes suitable for household use. He had something besides hair under his hat. He saw that the dust and fragments too small to burn should be separated from the coal before it was shipped out, and the huge lumps broken to avoid further waste to the consumer.

At his suggestion, the first coal screen ever run by steam power was erected by Hewes & Baber on the landing known as the Long Dock at Port Carbon. But before being screened the coal was broken with hand hammers or sledges in structures known pleasantly as "penitentiaries." It was first laid on planks and then on perforated iron plates. It was as clumsy as setting milk away in pans in the cellar to let the cream rise for making butter. These plates continued to be used for years, and even after some bright young men named Battin discovered that the coal could be broken a thousand times faster by machinery than

by hand, and invented a machine for doing it. They came from Philadelphia, too. The first man to set up one of their breaking rolls, history relates, was Gideon Bast, of Wolf Creek, near Minersville. Gideon knew a dollar when it looked him in the face. That primitive machine, with a circular screen attached and driven by a twelve horse power engine, broke and screened 200 tons of coal a day and saved the labor of fifty men, who could go and mine more coal, and speed up business.

For those industrial antiquarians who care to know, the Battin rolls were thirty inches wide and thirty-six long. They had cast-iron arms to carry the shell, which was armed with teeth, driven or bolted into hexagonal holes. In those days they shipped what was called "steamboat coal," in chunks three or four inches square. The teeth for these were three and a half inches apart, and equally high, and ran tooth to tooth. In the high speed year 1850 they shipped in addition to steamboat coal three sizes—stove, egg and lump, and Kaska William colliery shipped twelve carloads of four tons each in a single day. Wonders never would cease. What wasn't "steamboat," "stove," "egg" or "lump," they simply shoveled to the dump, along with the dirt and slate and refuse, to be dug out and washed for market three-quarters of a century afterward.

It is chronological and informative to say here that the Schuylkill region has been the pathfinder in almost all branches of anthracite preparation. Pottsville was using rolls for years before Wyoming got them, probably for the good reason that as we have seen, the Schuylkill and Lehigh measures are very steep. It is not possible to separate the coal and rock underground as carefully there as in the Wyoming district, where the measures are flatter. For the same reason, Lehigh and Schuylkill coal came up in bigger lumps and needed breaking. Up to 1852, when the Delaware, Lackawanna & Western Railroad built its Diamond breaker at Hyde Park, there had been "no such animal" in the Northern Field, and the Wyoming-Lackawanna coal went to market as it left the mine. In 1859 the road shipped all graded sizes down to chestnut, and in 1863 "pea coal" made its first appearance.

Methods were improving. With the formation of the great companies economy became respectable. Bituminous coal had cut into the trade of anthracite, as a steam fuel, and coke was beginning to gain popularity for use in the blast furnaces. The day of small sizes and recovery of the ancient wastes was already at hand. Anthracite was going to be "the housekeeper's coal," and it had to "come clean." In 1855 they first used water in the breakers to remove the dirt. Up

to that time the coal that was mined in the Winter had been stocked till Spring for shipment. In 1857 Ario Pardee, first of anybody, washed fresh mined anthracite all winter in the breaker, and shipped it to market while the weather demanded it.

The practice in the preparation of coal was fairly uniform until about 1872, when the Lehigh Coal and Navigation Company introduced "jigging." This was probably the first systematic washing of coal. Washing cleaned the fresh coal, but when the companies began cleaning the refuse from the ancient culm banks there was no other way out of it. The waste heaps of the early miners yielded a high percentage of marketable coal in small sizes, and forty per cent showed a profit. Washing paid. Later on, when even smaller stuff like No. 3 Buckwheat was made merchantable, the anthracite men took another leaf from the metal miners' book and set up Overstrom or Wiffley tables, which the millers of copper and silver use to concentrate the "fines."

The preparation processes of anthracite were complete. Today the job is done on a vast scale, in great buildings called "breakers," as the coal comes up to the mine mouth. It travels on carriers to the very top of the building, where it is first passed over a screen of parallel bars to remove the larger lumps. These go to one set of

rolls; the coal passing through the screen goes to others, or first to screens and then to rolls. The two streams of coal are then passed over screens which separate the different sizes.

In order to separate the impurities mixed with the coal, such as rock, pyrite and "bony coal," which is partly coal and partly rock, the sized material passes through chutes along which are seated men and boys, who cull out the impurities by hand. In the newer breakers the men and boys have been replaced by machines.

The day of small sizes has arrived. For the technical, here are the sizes of anthracite that now go to market, and, with some local variation, just what they mean in dimension:

Broken or grate, over 3¼ inch mesh and out end of screen.

Egg, over 2¼ to 2⅜ inch and through 3¼ inch mesh.

Stove, over 1½ to 1⅝ inch mesh and through 2¼ to 2⅜ inch mesh.

Chestnut, over ¾ to ⅞ inch mesh and through 1½ to 1⅝ inch mesh.

Pea, over ½ to 9/16 inch mesh and through ¾ to ⅞ inch mesh.

Buckwheat No. 1, over 5/16 inch mesh and through ½ to 9/16 inch mesh.

Buckwheat No. 2, over 3/16 inch mesh and through 5/16 inch mesh.

Buckwheat No. 3, over 1/16 inch mesh and through 3/16 inch mesh.

Between 1892 and 1905 the prepared sizes—lump, broken, egg, stove and chestnut, dropped from 76 per cent to 61.99 per cent of the total production, a shrinkage of 14.01 per cent. The small sizes showed corresponding increase. Since the smaller sizes are sold in competition with bituminous coal the prices obtained for all below the pea size are less than the cost of production and since the larger sizes, lump and broken coal are no longer in demand, it follows that the profit of operation must be largely derived from the domestic sizes.

Anthracite as it comes from the breaker consists of pieces of the varying sizes just stated, and 30 per cent by weight are the sizes from buckwheat downward that sell at less than the labor cost alone. People forget that anthracite is not all stove coal just as a steer is not all porterhouse steak. This table shows exactly how 100 tons of anthracite divide up and what the producer makes on it at the *mine* prices given in column 2. The prices the consumer pays are the mine prices plus freight and the retailer's cost of distribution and profit.

Results of Normal Yield from 100 Tons of Anthracite

	Tons	Mine Price	Realization	Average Cost per Ton	Gain or Loss per Ton	Total Gain or Loss
Lump and broken.....	5.4	$7.75	$41.85	$5.74	+$2.01	+$10.85
Egg	12.6	7.75	97.65	5.74	+ 2.01	+ 25.33
Stove	20.1	8.10	162.81	5.74	+ 2.36	+ 47.44
Chestnut	22.2	8.10	179.82	5.74	+ 2.36	+ 52.39
Pea	11.1	6.00	66.60	5.74	+ 0.26	+ 2.89
Buckwheat No. 1.....	14.2	3.50	49.70	5.74	— 2.24	— 31.81
Buckwheat No. 2 (Rice)....	6.8	2.50	17.00	5.74	— 3.24	— 22.03
Buckwheat No. 3 (Barley)..	5.0	1.50	7.50	5.74	— 4.24	— 21.20
Boiler (Birdseye) or other..	2.6	2.00	5.20	5.74	— 3.74	— 9.72
Total and averages.....100.0		*$6.28	$628.13	$5.74	+$ .54	+$54.14

*Average realization based on prices given which are constantly changing. The average cost has been increased by higher wages.

From this it will be seen that, applying the *maximum* company prices to the entire production, the average realization, instead of being $7.75 or $8.10 a gross ton, is $6.28, and that the average margin was 54 cents. From this margin must be deducted, before anything is available as profits or dividends, such summer and trade discounts as may have been allowed and Federal taxes. It is a safe guess, however, that the return on the investment in the last two years has ranged about 35 cents to 40 cents a ton. When it is considered that under present conditions the average investment in an anthracite property is from $8 to $8.50 per ton of annual output, it is clearly apparent that the average return in the anthracite industry is not more than 5 per cent on the investment.

VIII

Labor—The Long-drawn-out Battle Between the Mine Owner and the Mine Worker—Strike History of the Past Generation

PARALLEL with the story of coal and its transportation, and interwoven with it down to its latest subversive phase, runs the story of labor, of the miner and his persistent battle for a larger share in the profits of production. It has been a bitter battle, stained a little here and there with bloodshed. Public comfort has got no truce from it; the cold of winter and the needs of commerce and industry have been its sternest weapons.

It was an aged drama, with a new company and a new theatre—a "revival," merely, of the far away "union" struggles in all lands and ages, from ancient Egypt down. The mobs, the heroes, the obese oppressors—all were there. The lines of cleavage, the phrases, the paraphernalia, all were familiar—down to the war. War gave labor a new vantage, a new vision and a new plan of action.

Bare chronicle of this half century of conflict must pass over the "thrills," of which there have

been many, and as an abstraction it seems more or less sordid. To know its significance, it is necessary not merely to mark the progressive gains in wage rate, a great part of which must be counted in the normal advance common to all commodities and all service, but to weigh the meaning of concession, of legislative action, and at the last the reversal of established judgments and of public opinion regarding the rights and the deserts of the owners and carriers of the coal. Whether or not all these may be definitely set down as among the trophies which labor itself has won from a strong and stubborn adversary, they are certainly among the collateral spoils. Labor—and what it represents—cannot from its own standpoint be said to have lost.

Measure a little with the yardstick of anthracite history. From the time when Jesse Fell actually burned "stone coal" in his Wilkes Barre "nailery," down to the Civil War, Labor in the coal regions began with a small letter. It simply went down in the mines with a lamp on its cap and "dug coal." But all the time, for a dozen years, there kept coming the audible murmurs of protest. In 1849 one Bates organized the grumble into what he called "Bates's Union," for the purpose of calling a strike. When the strike had died an anaemic death and been duly buried, the organizer was found to have gone away from there, taking

with him all the funds. His name appears no more, nor did he.

In 1860 the workmen at the Forestville Improvement Company formed a union. It lasted four years, and other unions sprang up in various parts of the anthracite region. There were several small and noisy outbreaks but the real beginning of unionism came in 1868, when a controversy over the eight hour law demanded by the Workmen's Benevolent Association in Schuylkill County brought all the local and independent unions together into one organization. The legislators, after carefully calibrating the mine vote, enacted an eight hour law to go into effect on July 1 of that year. Before it could become operative the men struck for a ten hour wage for an eight hour day, and got it.

The important result of this strike was the organization of the Workingmen's Benevolent Association at Scranton, whose constitution has been the model in the organization of unions in the anthracite regions ever since. Real "labor troubles" were now in train. Production was high. Coal sold low. Producers wanted to cut wages; unions wanted to cut production and raise wages. Strike followed strike; the "sliding scale" was born. There were more strikes and compromises, first in the Schuylkill, then in the Northern field. Non-union men were hired in

Scranton; three were killed. Labor's battle was begun. The militia were called out. The miners promptly took away all their muskets and drove the "scabs" out of the mine.

Four months of idleness were ended by the first arbitration recorded in industrial disputes in the United States. History was making fast. The Northern and Southern fields—operators as well as men—were at loggerheads. In 1875 the operators got together and stuck together, and the Benevolent Association was no more.

For ten years there was quiet. Then came the wild reign of the "Molly Maguires," years when murder, arson and other outrage were commonplace through all the anthracite country, and to be a mine boss, or superintendent, or in any manner a friend of a coal operator was to know that your number was up. James MacParlan, a Pinkerton detective, joined the crew. They made him a secretary. He was the wildest radical of them all—in conversation. Then he sprung the trap. Twelve were hanged, others sent away for lesser degrees of murder, for arson and perjury. There was an exodus of unconvicted bad men over the Pennsylvania border. The living thanked God, and MacParlan got his pay check from the Pinkertons—and nothing more.

Huns, Slavs, Polacks began to people the mines.

The "confusion of tongues" kept the mine workers disorganized for fifteen years.

This was however a largely formative, or reformative period. The miners of bituminous coal had tried, in 1861, and again in 1873, to organize a national body, but had failed to make their structures last. In 1885 was devised the National Federation of Miners and Mine Laborers. They got so far as to establish, in conference with the operators, at Columbus in 1886, the first joint scale of wages. In the meantime the Knights of Labor had organized a competitive body known as "Trades Assembly No. 135, of Knights of Labor," composed of mineworkers. There were now two Richmonds in the field, which promised trouble forthwith and all the time. After one or two false starts, the divergent elements were brought together. At Indianapolis, on January 25, 1890, the National Progressive Union and Trades Assembly No. 135 Knights of Labor created the United Mine Workers of America, with John Mitchell as its first president. A new era was born in the history of labor. The United Mine Workers, under Mitchell's leadership, was to develop into a powerful organization, which in the thirty years that have intervened has perhaps had more influence over the coal mining industry than any other one factor.

The efforts, with varying fortune, and with more

or less bloodshed, to establish the union control in the bituminous fields in various States are only of moment here in the light of the widening power of the United Mine Workers, which in 1898 finally entered the anthracite fields of Pennsylvania. There was approaching a crucial situation which had been in process of formulation for a decade, and with which the conditions in the bituminous industry had much to do. During 1890, 1891 and 1892 the coal mining industry had been in fairly prosperous condition, and favorable for the development of union sentiment among the mine workers. The United Mine Workers had gained appreciable strength. In 1893, as part of the nation-wide depression, a deplorable condition set in. Prices were completely demoralized and in 1895, the calamity year for low prices, the average for West Virginia bituminous touched 59 cents a ton. From 1893 to 1897 strikes bloomed on every bush.

When the United Mine Workers entered the anthracite field they organized among the miners in the Shamokin district. By 1900 they had three districts, before named, Nos. 1, 7 and 9. They called on the operators to confer on the wage scale. Refusal brought a strike order. Somebody has called it a "great strike." It was presidential year. The "full dinner pail" was in danger. Political and financial influences were

brought to bear on the operators, who were compelled to advance wages 10 per cent and look pleasant.

A peace of expediency is as short lived as a moth miller. In 1902 there occurred in the anthracite regions of Pennsylvania a strike which in its duration and in the manner of its settlement has left its impress on the history of labor organizations, and become a high water mark in the adjustment of labor difficulties through arbitration. The days of bullets, blackjacking and arson, as arguments for the rights of man, were forever done. The ostensible reason for the strike of 1902 was the demand of the Mine Workers for an increase in wages, a decrease in time, and payment for coal by weight. The underlying cause assigned by the Anthracite Coal Strike Commission appointed by President Roosevelt, in its final report, was the desire of the United Mine Workers for recognition.

In February 1901, John Mitchell fired the opening gun. He asked for a conference. The operators said him nay. The mine workers convened at Shamokin and formulated their demands, with notice that they would only work three days a week until the operators came to an agreement with them, and they appealed to the Civic Federation to help them. The operators were obdurate. Mitchell's request for an arbitration committee

was also refused. Order was issued to stop work on May 12, and on the 15th it was voted to continue the strike which lasted till October 23. In the meantime supply of anthracite was nil, some people were burning their furniture to keep the children warm. The embargo on the use of bituminous coal in cities or restricted suburbs or any other old place was lifted. People paid any price asked for it rather than pass away from pneumonia. When even soft coal became unobtainable, President Roosevelt intervened and led the contestants to agree to an arbitration commission, to which all questions should be submitted.

All at last was well. The strikers went to work, with a retroactive understanding on wage rate, while the commission started its adjustments.

The awards were extended to 1906 and again to 1912. When this latter compact drew to maturity, the miners put in a new set of demands, many of them hoary with age, and coupled with them insistence on the abolition of the sliding scale, established by the Anthracite Coal Strike Commission, also on the setting aside of the Anthracite Board of Conciliation and on a new system of settling grievances. The sliding scale left no room for complaint about wage rate. John Mitchell after twenty years' service, had retired; John White succeeded him.

Serious trouble was averted in 1912 by an in-

crease of 10 per cent, the scrapping of the "sliding scale." They didn't shoulder out the Board of Conciliation nor obtain recognition of the Mine Workers. This last purpose they set about in another and a smoother way. The Mine Workers were playing good checkers now.

In 1916, when the country was swinging into the tremendous industrial activity of the war, into which it was launched the following year, the Mine Workers bobbed up with their list of demands. Just then it took coal to run things. They didn't want to stop the coal. Mining never was suspended. They were simply making the best move. The demands were referred to the negotiation committee of the Conciliation Board. In 1912 White had signed the agreements as "John P. White," but this time he added: "President of United Mine Workers of America, representing Anthracite Mine Workers' Organization." The nose of the camel was under the tent. The time had come to get busy.

The agreement was not twelve months old when new demands were made, on the ground that the munition plants were pulling men from the anthracite regions. The operators saw the handwriting on the wall. They advanced wages voluntarily. In November again the mining rates were advanced 25 per cent and day workers from 60 cents to $1.10. The operators were allowed by

the Fuel Administration to raise the coal price 35 cents a gross ton; the increased cost of getting it was 76.3 cents a ton. In 1918 again the miners' rates were increased 40 per cent, with larger proportionate advances to lower paid men. This was continued to the end of the war.

And then to the presidency of the Mine Workers came John L. Lewis. After three years a man speaking with the tongue of the coal operators said: "He certainly cannot be accused of lacking in forceful personality." The same used to be said of a certain "Blackbeard," one time lord of a castle overlooking the sweet harbor of St. Thomas in the West Indies. But that was long ago.

No sooner had the sails gone aloft on Mr. Lewis' low, rakish felucca than he had the mine workers and operators' representatives under one roof in New York to negotiate a new agreement. Following former practice, in times when something had to be done, a resolution was adopted that the mining go on and any agreement following be retroactive to April 1. It turned out there was a bit of a joker in this, for decision was not reached till September 2, five months later, and then only through the appointment of a Presidential commission.

The war had created strange visions of possibilities in the way of wage boosts. Talk of six

hour days and five day weeks echoed the recent doings in Great Britain, where the Sankey Commission had lately been dealing with readjustment of the British coal industry. The operators couldn't see it, but they offered a raise of 15 per cent. This and an offer of arbitration the Mine Workers under Lewis's lead rejected. There had been eight weeks of barren discussion.

Somebody had to do something. Secretary of Labor William B. Wilson, who as Secretary of a local on the Knights of Labor used to tramp twenty miles a day over the hills around Punxsutawney, Pa., in eighteen inches of snow, to see that the striking soft coal miners' wives had flour, called the disputants before him, heard their arguments and suggested a raise of 17 per cent. The operators agreed. Lewis would none of it. The Secretary reported to President Wilson that he could go no further. The President appointed the United States Anthracite Commission, with request to report in sixty days. Lewis had drawn the fire of the biggest guns there were. The commission awarded just what Secretary Wilson had proposed, but the Mine Workers organization was recognized in the signing of the agreement and they promised to live up to the articles.

The ink was scarcely dry when with one accord the mine workers began walking out. For three

weeks mining was practically stopped. President Wilson declined the miners' request to reopen the award, but did so after the men returned to work, for the adjustment of "inequalities."

The last inequality was adjusted on January 25, 1921. Just a year later at a district convention in Shamokin a new schedule of demands was adopted, nineteen in all, and eight of them had been rejected by the 1920 Commission. They called for a 20 per cent increase in wages, recognition of the union, the closed shop and the check-off. The scale committee was instructed to make arrangements for a suspension of mining April 1 lacking agreement.

Luck, as well as audacity, was with the Mine Workers. For the first time in twenty years of collective bargaining in the anthracite industry the wage agreement terminated on the same date as that in the bituminous mines. It created a strategic position for the union leaders, of which they did not fail to take advantage. On February 20, Lewis invited the anthracite operators to a conference on March 15. They protested that the time was too short to negotiate a new contract, but they went. The joint committee was to meet March 21. On the twentieth without notice he issued a call to all union miners—anthracite and bituminous—to cease work on the night of March 31, and in the first week of April told the Labor

Committee of the House of Representatives that the operators wouldn't let the miners stay at work during the negotiations. It was fast fighting, but a shade off Queensbury.

The miners obeyed the strike call. From April 1 to September 11 not a ton of anthracite was mined. Lewis was holding off compromise in the anthracite field until the larger fight in the bituminous had been settled. What happened to the public was negligible. They fussed and argued along till June 14, the operators stiffly maintaining that the conditions in the coal business absolutely required a decrease in wages. On July 1 the President called them to the White House. His overtures were accepted by the operators, Lewis turned them down.

In a message to Congress, President Harding was compelled to admit that the country was at the mercy of the United Mine Workers of America. In August opposition to the union's domination of the bituminous situation began to go to pieces. Then it was *suave qui peut.*

The two Senators of Pennsylvania, David A. Reed and George Wharton Pepper, offered proposals of mediation. There was truce till August 31, 1923, continuing the agreement that had expired March 31, and providing for a request to Congress for an investigating commission on the industry.

The armistice was signed September 3. On the 11th the miners went to work. In over five months the operators had made no attempt to work their properties. The strike deprived the public of 30,000,000 tons of anthracite; it cost the miners $143,000,000 in lost wages and the operators paid out some $30,000,000 in the maintenance of the properties.

The United States Coal Commission was duly appointed. It reported at length, but found out virtually nothing that was not already known as a result of seven or eight previous investigations. The indifference to this and other probings of the industry causes wonder as to whether the public wants to know the truth about anthracite or desires simply to have its preconceived notions confirmed. The 1923 Commission found that profits in the industry were not unreasonable; it exploded many other popular notions; it found that the mine workers were well paid, and that their scale of earnings was well above that of other workers owing not only to high rates of pay but to regularity of employment. And then the miners made another demand for increased wages and Governor Pinchot, as a self-constituted arbitrator, awarded them a 10 per cent increase over and above wage scales that already exceeded the war-time peak!

This made the labor cost of anthracite above $4.50 a ton out of an average mine price of something like $6. Yes, of course, the public paid the increase and the operator, as usual, was blamed for something that was due entirely to the demands of labor on the one hand and inarticulate public opinion and supine officialdom on the other.

IX

Protection of the Mine Worker—Outline of a Long Series of Welfare Measures—Mine Cave Laws—The Burden of Taxation

EFFORT by means of consecutive strikes and disturbances to force recognition of union labor and to secure for it ultimate control of anthracite production, as outlined in the preceding chapter, had companion and corollary in the legislation which was directed at the industry and its operators through almost precisely the same period.

Aside from the obvious and constant endeavor of labor to secure from legislation what it failed to obtain otherwise, and to enact its trade demands into law, the statutory enactments in regulation of anthracite do not differ essentially from other legislative procedure against large and highly localized enterprises. The difference is that what concerns anthracite concerns everybody in the anthracite consuming territory who wants to keep warm in the winter.

Labor did not obtain all that it sought by the framing of laws, any more than it did by strikes and other methods of impeding its opponents'

business. But it sent many ships to sea, and thanks to favoring winds some of them came home. Nor was union labor by any means responsible for all the legislation which has been framed in the State of Pennsylvania during the past sixty years to make straight and painful the way of the anthracite operator. There have been municipalities which sought through legislation to secure from the coal interests, by specific reversion, more taxes than they had any home machinery for collecting. That's merely a sample. In a hotel lobby at Harrisburg, in any legislative session, you could have lost a lot of money betting you could pick out a statesman who didn't have a single "coal bill" concealed about his person.

But aside from all purely polemic or—to use a gentle definitive—acquisitive legislation, there has been, through the past half century or more, in the State of Pennsylvania, a steady sequence of enactment which has changed, both in large and in little, the whole picture of anthracite mining. Much of it has been of a humanitarian nature. Labor, striving for the betterment of its own conditions of work and of living, has brought about a very large part of this. Catastrophes in mining have enlisted for a great deal of it the sympathy and endorsement of the whole public, which in turn has reacted to the benefit of labor in the prosecution of its material ends. In the main,

however, it has been part and parcel of the great change in modern sentiment toward improvement in the environment of those who toil, both as a humanitarian and as an economic movement.

It is a common notion that anthracite legislation began with the broad and more or less basic law of 1870. This, however, was the outgrowth of an inspection law for Schuylkill County, passed and approved on April 12, 1869, providing the first mine inspection that ever had been known in the United States. And this law arose directly from the strike for an eight hour day which occurred in that county in 1868, which has been referred to in a preceding chapter as the genesis of unionism.

In the light of recent events, it is of studious interest that the Pennsylvania laws of 1869 and 1870, which have served as basis for most of the later mine laws in that state, both in the anthracite and bituminous regions, and in other states as well, were taken largely from the English enactments of that time on the same subject. The 1869 measure had only been in force for a few months when the Avondale disaster shocked the world. The coal breaker at the Avondale shaft of the Delaware, Lackawanna and Western Railroad Company, in Luzerne County, a wooden structure, took fire. The breaker was immediately over the shaft. Burning material fell down and set fire to the shaft timbers. At that time there were few

"second outlets" to mines in the anthracite region. Avondale had none. The picture paints itself. With their only avenue of escape a gallery of fire, more than a hundred miners were suffocated. It was the specters of Avondale that passed the new and sweeping mine law of 1870, a scant six months afterward.

The County of Schuylkill, always a pioneer in rebellion, forced the law of 1869. After Avondale, the anthracite region was a unit for a law that would give a miner a fighting chance for his life—and a few things beside. The provisions of the "Ventilation Bill" applied to all counties. Its six most important features were:

(1) Employment of competent persons by the State to inspect the mines and see that the provisions of the law were carried out.

(2) Accurate survey and mapping of the mine working so that a map could be kept at the colliery.

(3) The provision of at least two openings to each mine, fitted with suitable appliances for escape.

(4) Provision for at least two hundred cubic feet of pure air per minute for each employe in the mine, and the division of this air into separate currents or

splits, so that not more than 75 persons should be employed upon each current.

(5) The reporting of all accidents to the inspector and investigation of them by him.

(6) Promulgation of general rules for the regulation of the conduct of employes and provision for punishment of violators of the law.

The experience of a few years demonstrated that the money thus spent was a profitable investment, and note also this comforting statement out of the statistics of the past:

"In 1870 the coal produced per death was only 59,969 tons, while in 1897 it was 110,727 tons. The number of deaths per thousand employes in 1870 was 5.601, and in 1897 only 2.83, showing that the ratio of fatalities per one thousand employes is reduced proportionately to the increase of the quantity of coal per death."

In 1885 a gubernatorial commission of six miners, three operators and six inspectors made recommendations on which a revision was based, dealing in more detail with measures of safety. One of its provisions was for the establishment of

a system of certificated mine foremen, a certificate being given only after rigid examination by a board of examiners appointed by the court.

This was a cue to the miners. In 1889 they forced passage of an act requiring a certificate based on two years' experience in mining before a man could mine coal in the region. It was something brand new, and it was well camouflaged. In 1897 it was modified. No man could mine coal in the anthracite districts now unless he had had two years' experience as a laborer *in the mines of Pennsylvania.* The operators have been squirming under this law for thirty years. The meaning was undeniable. In case of a strike, or a shortage of labor, the operator could no more bring in strike breakers, foreigners or men from other states. The law created a monopoly for the United Mine Workers.

The thing was fought with a test case through all the courts in Pennsylvania. The trial court sustained its constitutionality, the Superior Court reversed, the State Supreme Court upheld the trial court and the act. The United States Supreme Court, to which appeal was taken, had already ruled that in such cases the highest tribunal in the state was the court of last resort, and its decision was final. In all the stream of strategic legislation that has taken up the time of state lawmakers,

the miners have never scored a bullseye so definite as this.

Study of the endless lists of bills proposed that were defeated, bills passed that were speedily lost in the accumulation of dead letter, throws a certain light of vindication on the selective sense of legislatures. Over the entire period of years what has actually been accomplished, for all the red tape and fuss and feather of legislative motion, is confined to two or at the most three definite lines: The improvement of mine conditions, leading on humanitarian lines to the care of the injured, the liability of employers and thus to the compensation measure.

The improvement of mine conditions, with its corollaries, proceeded in pace with the general trend in all industries, perhaps somewhat more rapidly owing to the hazardous nature of the mine employment. It was necessarily accomplished by successive steps, and in the beginning against some opposition from those reactionaries who did not believe in mollycoddling workers. The general result achieved in the end is not unimpressive.

Inspection service, which was the root from which all later welfare measures sprang, and the need for which was shown so forcibly by the Avondale incident, was extended in 1877 to cover the bituminous mines of the state. Very casual

checking of the progress made in the direction of mine improvement will show that much of it was made while the union organization was at a low level of activity, which tends to bear out the claim of the operators to a share in the credit for it. There was however no long step forward until 1897, when a State Bureau of Mines was established under the Department of Internal Affairs.

In 1903, this Bureau was made a State department, entitled the Department of Mines. Its functions included the execution of the mine laws of the Commonwealth, the care and publication of the reports of inspectors of all mines, including those of coal, which came under the State laws. The good accomplished by the inspection system, which was widely adopted by other mining States, was doubtless vitiated by the unions themselves, in promoted legislation which made the office of mine inspector elective, instead of appointive, and thus throwing it into the arena of local politics. It was a retrogressive step, taken for tactical purposes, at a time when the rest of the industrial world was earnestly moving forward. Later, when years had brought understanding, the measure was repealed and the inspectorship of mines again made appointive.

Mine inspection, which was a comprehensive term, led of necessity to some systematic means of caring for men injured in mine accidents. The

Pennsylvania legislature passed, in 1879, the first measure in this direction, providing for the establishment of a miners' hospital at Ashland. The hospital was opened for patients in November 1883, in 1887 the second hospital was erected at Hazleton and later a third at Pittston. In the Spring of 1901 a law was enacted requiring the anthracite mines to establish and maintain emergency hospitals in the mine, to be thoroughly equipped, in order that first aid to the injured should be prompt and effective. This law, which went into effect forthwith, was the beginning of a movement which within a short time spread through the entire mining industry, and there are now few if any large mining companies that do not maintain underground hospitals, with trained first aid crews available upon short notice.

The wave of reform which swept over Pennsylvania after the anthracite strike of 1902 cast up some strange things in the 1907 session in the way of legislative projects—among them one to rehabilitate the canals of the State as common carriers and put the railroad octopus out of business so far as coal and other heavy freight were concerned. Most of the flotsam went out with the receding tide. The union lobby succeeded in pushing through a number of bills, and in defeating all measures for the strengthening of the State police. One important bill, affecting anthracite in com-

mon with other industries, received final approval —the employers' liability act.

This brief but cogent statute abolished the "fellow servant" doctrine as a defense in action for injuries received by an employe, in any of the following contingencies: By any defect in machinery, works or plant of which the employer might have had knowledge by ordinary care; by the negligence of any person in charge who had direction of the works in general or the particular piece of work involved; or by the act of any fellow servant who was following the rules or orders given by any person in authority.

There was a constant stream of welfare measures. In 1911 it was made law that all buildings within coal mines should be made of incombustible materials. In 1913 an industrial accident commission of five persons, to report to the 1915 Assembly was authorized, and it was also directed that all employers must report within thirty days all accidents to employes in the course of their work; also that anthracite mines should have mine hospitals or first aid stations with specified equipment at inside and outside points. This was making universal, by statute, a policy which had already been widely applied by the chief anthracite producers. All these things foreshadowed the Workmen's Compensation law, which, with a flood of other legislation affecting anthracite, was passed at

the 1915 session. The small seedling of "inspection," planted by the Schuylkill miners in 1868, had grown to a fine tree.

And then there were the boys.

In the anthracite mines a great number of boys have always been employed, principally in the breakers. The law of 1870 fixed the minimum legal age for boys inside the mine at 12 years, but made no provision for the age of boys outside. The revised law of 1885 and 1891 fixed the limits at 14 for boys inside the mine and 12 outside and in 1905 this was finally changed to 16 and 14. In 1909 employment of any boy under 14 around any coal mine, or the employment of any minor under 16 years more than ten hours in a day or 58 hours a week or without an employment certificate issued by the school authorities was prohibited. In 1915 the minimum age for boys in any coal mine was fixed at 16 years. Only a few thousand boys are now employed.

And the mine cave laws. In 1913 the whole anthracite population was in the state of the burghers of Shenandoah hereinbefore mentioned; it had nervous prostration. It was afraid the State was going to cave in, as once did the clay-bottomed city of Haverstraw, in an undermined attempt to drown itself in the Hudson river. In 1911 an effort had been made to give cities and towns power to go ahead and prevent the catastrophe. Governor

Tener vetoed the bill and appointed a commission with two years in which to think it over. When the momentous session of 1913 arrived they passed a law empowering towns to establish something solemn—Bureaus of Mine Inspection and Surface Support—which should inspect mines at will and keep the town on top of the ground as best they were able. The mine owners were directed to help by furnishing maps to the minute—probably so a man could select his place of burial—and giving advance notice of any new places of interment they intended to open.

It was the beginning of a toilsome and disputatious journey, which ended only at the United States Supreme Court. Comic opera needs no more amusing theme. Scranton and its suburbs and the northern districts of Luzerne county were the storm centers. "Mine cave" agitation was a recognized profession thereabouts for several years. The meat of the business was that the land had two sides, top and bottom. The coal was on the bottom. The buyer of the surface, who wanted to build a house or raise cabbage, had always taken it on the basis of *caveat emptor*, which as there translated meant that every man's house was his grave as well as his castle. What the "mine cave" evangels were trying to do was imbed something in the laws of Pennsylvania which should compel the unhappy coal owner who was mining underneath to pay the

cost of the engulfed houses and cornfields, masses for the soul of their owner and a bit to solace the heirs. And, if he didn't show proper humility, a stretch in jail besides.

The producer of anthracite, by 1915, had become inured to all forms of extractive surgery. Having something taken away from him was his daily bread, and contumely the butter thereof. He said —in the Scranton district at least—that he'd pay for any residents or real estate that got entombed in his coal mine. This only spurred on the hue and cry. What they wanted was punitive legislation, and they kept on producing it till 1921, when the "Kohler Act" was handed down from amid the thunders of Harrisburg.

Here are a few of the "thou shalt nots": "Mine anthracite so as to cause the caving in, collapse or subsidence of any public building or any building, such as theatres or hotels, customarily used by the public; any street, road, bridge or other public passage; any track, roadbed, right of way, pipe line, conduit or other facility used by a municipality or public service corporation, any dwelling, factory, store, industrial or mercantile establishment—*or cemetery*."

Even around those already buried the "Kohler Act" threw the cloak of its protection. Anybody with municipal sanction, from the mayor down to his butler, could go in and inspect or shut down the

mine. Anybody from the president of the mine company down to the foreman could be fined or imprisoned for "violation of the act," and power of injunction to restrain operation, was confided to the common pleas courts.

The new toy was played with forthwith. Injunction was served on the Pennsylvania Coal Company, which had declared intention of mining its coal from a tract of land in Pittston. The judge (Fuller) upheld the constitutionality of the act. Then the worm didn't turn. He crawled in his hole. Producers in Scranton, especially the Lackawanna interest, declared it was impossible to mine coal there without being branded as felons and sent to jail. They shut down the mines. The bubble was "bust," the groceryman called around for his bill; "the mourners went about the streets—including processions of idle miners—and the sound of the grinding was low." Agitators saw the first light they had seen in a dozen years, and the "inspectors" allowed they'd go easy. The Pennsylvania Supreme Court sustained the act and the Supreme Court of the United States buried it. The coal mining counties are still right side up.

On the same wave of emotions that brought the "mine cave" obsession came in 1911 the initiation of measures to lay a flat tax on anthracite tonnage. The story of these is briefly told. They imposed an advalorem tax, which anthracite still

carries, to the tune of 1½ per cent, but the anthracite tax was only a stalking horse for a vaster scheme. The financiers in State Capitol circles had their eyes on bituminous coal, natural gas and petroleum, and it was proposed to line up West Virginia, Ohio and Maryland with Pennsylvania in a campaign for a tax on all these products, which should be equal in all the States. A conference with these States was authorized by joint resolution but diplomacy had counted its poultry too soon. The other States had other fish to fry. But the tax on anthracite remained—a sinister sign of what the future had in store—in spite of the heated objection of States whose citizens paid the tax in the form of higher coal bills.

As a footnote to this subject, it developed in 1923 that the tax gatherers refused to accept their 1½ per cent on values that, they claimed, were below the maximum price at which the coal could have been sold. In other words the tax gatherer said to the coal producer: "You might have charged the public more for your coal, and so we shall assess the tax not on what you did get for it but on what you might have exacted from the consumer."

It is true that "Coal Barons" have few friends but they are entitled to sympathy on two counts at least: the tax system of Pennsylvania and the seeming hopelessness of their contest with labor

in the first instance for a fair contract and then for its observance. For every general strike of which the public hears there are 150 petty outlaw strikes—all in violation of agreement and in a majority of cases aimed to enforce the closed shop which the Roosevelt award refused to establish.

X

Recasting the Anthracite Organization—Divorce of Producers and Carriers—The "Independents" and the "Companies"

"SELF preservation is the first law of Nature" is an axiomatic proposition that actuated the governing elements in the anthracite industry during the last three decades of the 19th century and the earlier years of the present one.

Following the close of the Civil War there was a notable increase in the production of anthracite, resulting in conditions closely resembling those that are affecting the bituminous coal industry at the present time, except that the situation at that time was not complicated by the presence of an all powerful labor union. But it was bad enough. Competition of the most ruthless character held sway. Labor was underpaid, prices were unremunerative, demoralization was general so far as markets were concerned and at the same time the transportation companies were scrambling for the possession of coal productive territory, to protect, as they felt, their interests as producers of, as well as carriers of anthracite.

It must not be forgotten that it had been the

settled policy of the State of Pennsylvania to encourage the development of its anthracite lands by canal and railroad construction, and some of the companies were given rights in their charters to engage in the mining, buying, selling and transportation of the coal. The final result of the land buying mania was the acquisition by the transportation interests of approximately 90 per cent of the unmined areas. (The United States vs. The Reading Co. 226 U. S. 57 L. ed.) Ten per cent of the unmined coal, however, remained in the hands, mostly by lease, of independent operators who produced from 20 to 25 per cent of the tonnage.

No Interstate Commerce Commission controlled at that time the freight rates that transportation companies were allowed to charge. The railroad companies, mining, selling and transporting their own coal or that of their subsidiaries, could recoup their losses on the coal business from the revenues derived from transportation. The "Independents" had no such means of warding off the landlord or the sheriff. They paid the same freight on their product as did the railroad companies which thus had the profits coming from the transportation of the "Independent" coal as well as from the transportation of their own product.

Naturally as a result of these conditions the

"Independents" were peeved. They inaugurated a struggle for their very existence. The cry from Macedonia was to the effect that the railroad companies were in a combination to put them out of business and thus secure monopolistic control of Nature's own monopoly—the anthracite deposits of Pennsylvania, a cry that was not without justification when the deal that centered about securing control of the Temple Iron Company with its all including charter is considered.

The appeal of the "Independents" did not fall on deaf ears. They aroused the sympathy of the public, and such a sentiment was aroused that the big boys could not fail to give heed. Compromises were effected. The railroad companies bought the production of the "Independents," paying them 40 per cent of the "tidewater price," the transportation companies pocketing the 60 per cent to compensate them for their freight and the expense of marketing the product. It soon developed that in this division the "Independents" got the short end. More cries went up with the result that the "Independent" percentage was increased to 50, to 55, to 60, and finally to 65 per cent of the tidewater price, but the last concession was not secured until the "Independents," led by one of their aggressive members, the firm of Simpson and Watkins, secured a right of way, bought rails, and

started to build their own line of transportation to tidewater.

And now began the demolition of the structure that had taken half a century or more in its building. The placing of the keystone through the instrumentality of the Temple Iron Company was, if a mixed metaphor may be permitted, the last straw on the camel's back. It was immediately attacked and quickly destroyed, and the year of grace 1924 witnessed the final act in the destruction of the "temple" in the segregation, by order of the U. S. Supreme Court, of the coal mining and transportation interests in the anthracite industry.

A great deal of nervous tissue and printers' ink—infinitely more of vocal energy and legal craft—has been expended *pro* and *con* upon what was called the Coal Trust. For a time, at least—and perhaps for all time—they may with wisdom be turned to other things. The "Coal Combine"—so far at least as outward seeming may go—is sufficiently disjunct to have ceased from troubling. Like rent and discomforted Germany, its severed members remain as a warning to bad guessers. Behind it the United States Supreme Court stands like the Angel of Judgment and at the end of the path Super Power looms to put a perpetual crimp in its tonnage.

But the miners are still "jacking" away at the breast, the breakers are still tumbling out millions of tons of "domestic sizes." The trains still trundle out of Scranton and Shamokin, Pottsville and Wilkesbarre, to the waiting cellars of the world.

It is not easy to decoct the whole turbulent history of fifty years and pull out a clear and just residuum. All the noise and smoke of battle have left to the average person only a nebulous idea of what was the real kernel of wickedness—if any—in the "Coal Combine." It always furnished him coal and what is more to the point, it furnished him coal at less cost than he could otherwise have obtained it. The only time the industry got pneumonia was when the Mine Workers tied things up with a strike. He, the average person, was too busy trying to make his own shop pay its overhead to analyze the griefs of coal miners in Pennsylvania. With him, the *onus probandi* was always on Mr. Mitchell, or Mr. White, or Mr. Lewis, who in turn were too busy fighting their own battles to care whether the public was warm or cold. They knew, of course, as if by divine revelation, that it was all the fault of the "Trust."

To the complaint of Labor was added, without ceasing, that of the independent operator. The essence of his (the independent operator's) sorrow

was this: The "Coal Roads" didn't care to make a big profit off the mining of the coal, of which all told they owned about 90 per cent. They meant to make it off the carriage. As I have explained, they had tied this up so as to know where they could get tonnage when they needed it, and they always needed it. They could afford to cut the gain from mining down to nothing. The independent, who wouldn't pay tribute to the railbund, had to make his from the mining of his coal, but the railroads charged him as much for hauling his coal as they did themselves for hauling their own. As I have said, they put their freight bills back in their own pockets; and they put his there too. But their coal cost them little or nothing, the way they had it figured; his cost his life.

Now to go back a bit: There were two or three roads that were "charter members." I have told about them. They began hauling coal on rafts, then they hauled it on canal boats. They were the "first families" when the railroad period came along. The Ontario and Western, as I have intimated in Chapter VI, was about the last of these that was able to "horn in" to membership. It had the New Haven behind it, and that helped some.

There were perilous times in the anthracite industry as you would learn if you had nothing to

do the rest of your life but read the testimony in the "coal cases." But you had better read the Encyclopedia Brittanica through instead. It will do you infinitely more good, and take far less time. When finally the day of reckoning came, the sufferings of the independents who were left out in the cold were the most pathetic part of the picture that was presented to the Federal courts.

But here comes in again the human equation. I cannot discover any proof in all these documents that the late comers had any softer hearts than those who by right of priority sat at the head of the table. If the Delaware Valley and Kingston, or later the New York, Wyoming and Western, the railroad started by Simpson & Watkins and other independent operators but never completed, had got in before the quota was filled and had been accepted into full fraternity, instead of having their right of way both physical and financial obstructed, their social aspirations blighted and their properties finally sold out to the "big fellows," there is no precedent for believing that they would have been any better or worse than the rest. Nor do I believe that in the "jackets" in the files of Labor they are rated as more kindly to the children of toil.

The insistent lesson in all that phase of the story is that business is business. The coal business—

which is to say the specter of the "Coal Road Combine," was too tempting a subject for popular attack. It was all very well to lower the carrying rates to independent producers, in the very hour when the court was hearing their testimony, but was it not a bit transparent? The "devil-was-sick"-ness of people and corporations is the best argument for "public relations" departments and publicity advisers who have some contact with the mass mind. In the final reading, near at hand, of what happened to the Coal Roads, you will arrive at the understanding of this observation. It did not gild the relation of the offending coal carriers to modern and overtaxed society or its laws, to know that long-ago legislatures in Pennsylvania had encouraged the development of the very thing of which complaint was now made. Former things were passed away. The protagonists of combination, who in the day of stress and mourning became its apologists, could not paint a sufficiently convincing picture of "competition" to dim the significance of interlocking directorates. That a road advertised its own coal was cited by a Pennsylvania judge as proof that it was independent of entangling alliances, but even Phoebe Snow had no seductions to soften the indurated organs that pass for hearts on the Federal Bench.

And so it all came to an end. The ironclad control of anthracite in the United States has passed away. An amiable justice, seeking to fend off the sad day, said in his opinion:

> "It is urged by the defendants that the destruction of present conditions and methods attending the production and sale of coal will produce a deplorable anarchy in the trade, and involve in confusion and financial loss all those engaged therein, a confusion and loss by which the consumer is bound to suffer."

Being held over the mouth of the bottomless pit in this manner had no terrors for the homekeeper who had been paying the coal bills and longing for a warmer climate. The generation which had known Chateau Thierry and learned to think in the terms of bonuses and war bond issues maintained its calm when His Honor went on:

> "When we consider that some of the defendants ship coal to almost every State and to three foreign countries, we obtain some conception of the magnitude of the trade and the need of caution in dealing with so vast a subject."

For one who holds no brief for them, it is difficult not to suspect that it was this magnitude, the

consciousness of might that caused a great part of the grief of the coal roads. The same thing has cost many a ringster a trouncing. In 1890 there was passed at Washington what was known as the "anti-trust act." All through the "nineties" the Coal Roads were going ahead, increasing their tenure of lands, enlarging their rail systems, cementing their control of as much of the anthracite business in every direction as they could find capitalization to finance.

In 1900 and in 1902 the greatest anthracite strikes the country had known brought into the limelight the whole situation in the field of anthracite production. Labor carried its stubborn fight in the 1902 contest into the White House. The entire business of the country was by the ears. But there was a new foot on the floor. It was plain in the measures that for years had been getting themselves passed in legislatures all over the country. The United States that worried through the coal strike of 1902 was not the United States of 1875. It was full of a new idea. Books, press, and pulpit echoed it. Anthracite sat back behind its entrenchments—largely built of old State enactment and by no means proof against newfangled artillery, and went on, as late according to the record as 1915, drawing in more and more coal property, expanding along the ancient

lines the systems it had so long and earnestly been building.

In war, a cruiser fires blank, or across a merchantman's bows, to halt her. The next is solid shot. In 1906 the Hepburn Bill was passed, on June 26. The now famous "Commodities Clause" in that measure read like this:

> "From and after May first, nineteen hundred and eight, it shall be unlawful for any railroad company to transport from any State, territory or the District of Columbia, or to any foreign country, any article or commodity, other than lumber or the manufactured products thereof, manufactured, mined or produced by it, or under its authority, or which it may own, in whole or in part, or in which it may have any interest direct or indirect, except such articles or commodities as may be necessary and intended for its use in the conduct of its business as a common carrier."

There are people—and not too far back from the railroad either—who still think the meaning of this passage was obscure. Coal circles believed that it might be directed at anthracite. In any case it was not invoked as basis for the first legal action that was taken toward the "unscrambling" of the coal roads and their subsidiaries, a suit in

equity in the Circuit Court for the Eastern District of Pennsylvania. The defendants were the Reading Company and its owned and affiliated companies, viz: The Philadelphia and Reading Railway Company, the Central Railroad Company of New Jersey, the Philadelphia & Reading Coal & Iron Company, and the Lehigh and Wilkesbarre Coal Company; the Lehigh Valley Railroad Company; the Lehigh Valley Coal Company; the Erie Railroad Company; the Delaware, Lackawanna & Western Railroad Company; the New York, Susquehanna & Western Railroad Company, the Pennsylvania Coal Company, the Hillside Coal & Iron Company, the New York, Susquehanna & Western Coal Company and the Temple Iron Company.

They were charged under the anti-trust Act of 1890 with being or holding a monopoly in the mining, transportation and sale of anthracite. A question of constitutionality revealed a way of egress from what was suddenly realized to be a real situation. From the Supreme Court's decision on appeal it was derived that the law permitted a railroad to operate mines and to sell the product to an independent agency before transportation over the company's rails.

It all looked foolishly easy. Forthwith some sweeping divestments were made; coal companies

and sales companies were organized, new sets of books opened and general disposition to make it look as if the railroad didn't own the coal. There was a long period of backing and filling and legal weariness. The smile had at last "come off." In February, 1913, suit was brought in New Jersey against the Delaware, Lackawanna & Western Railroad and its selling organization of the same name, under the "Commodities Clause," alleging that the organization of a sales company did not divest the railroad of interest. The Circuit Court dismissed the case. The Supreme Court reversed the decision with the opinion that the contract was invalid in view of the restrictions upon the coal company "so hampering and restricting such alleged buyer as to make him a puppet, subject to the control of the railroad company."

The Lackawanna in 1921 sold its coal properties to the Glen Alden Coal Company for sixty millions. It is just a railroad now. But the venerable Reading was a horse of a different hue. Its leases and its stock controls, its coal companies and iron companies and land companies and holding companies and reorganizations made a maze out of which even the district court did not emerge with a decision until 1915, two years after the action was brought, and even then it was only

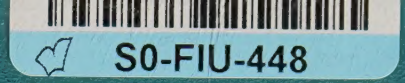
to be reversed on most of its points by the Federal Supreme Court, which held that its reorganization plan of 1896, with a holding company for both railroad and coal companies, was a combination in restraint of trade, that the using of the Temple Iron Company to kill off the New York, Wyoming & Western was a misuse of power "for the purpose of violating the law"; that the purchase of control over the Jersey Central was an absorption, in effect, of a competing railroad and a competing coal company; that the provisions in coal land leases limiting the routes for shipment were unlawful; that the combination with the Philadelphia & Reading Coal & Iron Company and the combination of the Central Railroad of New Jersey and the Lehigh & Wilkesbarre Coal Company violated the commodities clause of the act and must be dissolved.

It was properly called the "Reading Segregation" case. About everything that could be segregated was segregated, and in the case of the Reading Company itself, the holding organization for all this extraordinary pudding, decree was entered dissolving the combination between the Reading Company, the Philadelphia and Reading Railway Company, the Philadelphia & Reading Coal & Iron Company, the Central Railroad of New Jersey and the Lehigh & Wilkesbarre Coal

Company. There was further provision, to pry the two last named apart, and the respondents were left to untangle the snarl with the stockholders. The Reading's plan of segregation has received the approval of the courts and it is being carried out. The Central Railroad of New Jersey sold the Lehigh and Wilkesbarre Coal Company outright.

It was much the same story with the Lehigh Valley case, but infinitely less of it, and the decrees were in effect the same. The manner in which the policy of absorption had been pursued was stressed in the Court's decision which held that the buying and leasing of coal lands tributary to the system, such as the purchase of Coxe Brothers & Company, Inc., and the Delaware & Schuylkill Railroad Company for the purpose of controlling inter-State trade in anthracite was entered into and pursued after the passage of the anti-trust act. Lehigh's plan of segregation has also met the court's approval, has been put into effect and, as is the case with Reading, it has a crew of trustees aboard to see that the "good old days come again no more." It remains to be seen whether or not these acts on the part of government and the courts will result in better service and cheaper coal to the public.

THE END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